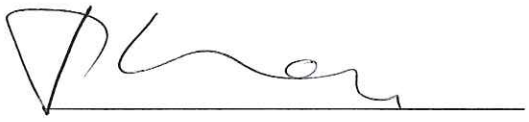
ASB Biodiesel (Hong Kong) Limited

Development of a Biodiesel Plant at Tseung Kwan O Industrial Estate

Monthly EM&A Report

May 2016

(Version 1.0)

Certified By 

(Environmental Team Leader)

REMARKS:

The information supplied and contained within this report is, to the best of our knowledge, correct at the time of printing.

CINOTECH accepts no responsibility for changes made to this report by third parties

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To:	Cinotech	*Date:*	29 July 2016
Attn:	Mr. H. T. Lai	*Fax:*	3107 1388
From:	Mr. Mark Cheung	*Ref:*	D1067/L04879
Job No.	D1067	*Total Pages:*	1

Subject: **Development of a Biodiesel Plant at Tseung Kwan O Industrial Estate Monthly EM&A Report (May 2016)**

Dear Sir,

We refer to your submission of the Monthly EM&A Report for May 2016 via email dated 19 July 2016.

We write to advise that we have no comment on the captioned report.

However, it is noted that exceedances of limit level were recorded during the report period. Please make sure proper remedial measures are implemented and keep tracking the effectiveness of the remedial measures.

Regards,

Mark Cheung
Independent Environmental Checker

KTC/gk

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EXECUTIVE SUMMARY

Introduction

1. This is the 2nd monthly Environmental Monitoring and Audit (EM&A) Report prepared by Cinotech Consultants Limited for Development of a Biodiesel Plant at Tseung Kwan O Industrial Estate in operational phase. This report documents the findings of EM&A works carried out in May 2016.

Environmental Licenses and Permits

2. Licenses/Permits granted to the Project include the followings:
   - Environmental Permit, EP-319/2009/D, granted on 28 January 2014; &
   - Water Pollution Control Ordinance Licence, (WT00022972-2015), granted on 16 December 2015.

Environmental Monitoring and Audit Works

3. Environmental monitoring and audit works for the Project were carried out in accordance with the criteria and requirements listed in the EM&A Manual, Environmental Permit granted, and Water Pollution Control Ordinance (WPCO) Licence granted. Monitoring results were checked and reviewed.

Key Information in the Reporting Month

4. Summary of key information in this reporting month (May 2016) is listed in **Table I**.

Table I Summary of Key Information in May 2016

Event	Event Details		Action Taken	Status	Remark
	Number	Nature			
Exceedance of Action & Limit Levels	2	--	Exceedance events were investigated and measures have been proposed.	N/A	---
Complaint received	0	---	N/A	N/A	---
Changes to the assumptions and key construction / operation activities recorded	0	---	N/A	N/A	---
Status of submissions under EP	0	---	N/A	N/A	---
Notifications of any summons & prosecutions	0	---	N/A	N/A	---

1 INTRODUCTION

Background

1.1 Development of a Biodiesel Plant at Tseung Kwan O Industrial Estate (hereafter referred to as "the Project") is to construct and operate a 100,000 tonnes per annum biodiesel plant at Tseung Kwan O Industrial Estate (see **Figure 1.1** for the location plan of Project Site). The plant will use a multi-feedstock which consists of used cooking oil (UCO), oil and grease recovered from grease trap waste (GTW), palm fatty acid distillate (PFAD) and animal fats. The proposed biodiesel plant offers a convenient recycling outlet for GTW and UCO, and converts oil and grease recovered from these wastes into useful products. The Project also offers a more environmental-friendly alternative to the diesel fuel market in Hong Kong.

1.2 This Project is a Designated Project under the Environmental Impact Assessment Ordinance (Cap. 499). An environmental impact assessment (EIA) was undertaken to identify and evaluate the impact on environment (e.g. air quality, noise, water quality and ecology), and propose possible measures to mitigate the impact. The EIA Report was approved by the Environmental Protection Department (EPD) on 26 February 2009.

1.3 Environmental Permit (EP) No. EP-319/2009 was issued on 11 March 2009 to ASB Biodiesel (Hong Kong) Limited as the Permit Holder. After several rounds of amendments, the latest version is EP No. EP-319/2009/D, which was issued on 28 January 2014.

1.4 Construction of the Biodiesel Plant has been completed since October 2013. After more than 2 years of commissioning trial, the Plant started to operate in April 2016. Cinotech Consultants Limited was commissioned by ASB Biodiesel (Hong Kong) Limited to undertake the Environmental Monitoring and Audit (EM&A) works for the Project. This is the 2nd Monthly EM&A report summarizing the EM&A works in operational phase for the Project in May 2016.

Project Organizations

1.5 Different parties with different levels of involvement in the project organization include:

- Project Proponent & Operator – ASB Biodiesel (Hong Kong) Limited
- Independent Environmental Checker (IEC) – Mannings (Asia) Consultants Ltd.
- Environmental Team (ET) – Cinotech Consultants Limited

1.6 The responsibilities of respective parties are detailed in Section 2 of the Final EM&A Manual of the Project.

1.7 The key contacts of the Project are shown in **Table 1-1**.

Table 1-1 Key Project Contacts

Party	Role	Name	Position	Phone No.
ASB	Permit Holder & Operator	Mr. Albert Kwan	Facilities and Operations Manager	3183 4209
		Ms. Tiffany Wu	Engineer	3183 4204
Mannings	Independent Environmental Checker	Mr. Mark Cheung	Independent Environmental Checker	3168 2028
		Mr. Gavin Kwok	Assistant to Independent Environmental Checker	3970 8628
Cinotech	Environmental Team	Dr. HF Chan	ET Leader	2151 2088
		Ms. Betty Choi	Project Coordinator	2151 2072

Summary of EM&A Requirements

1.8 EM&A requirements for the Project include:

- Monitoring requirements as listed in the Project EM&A Manual; &
- Conditions listed in the Environmental Permit.

2 STATUS OF ENVIRONMENTAL LICENSING AND PERMITTING

2.1 All permits/licenses obtained for the Project are summarized in **Table 2-1**.

Table 2-1 Summary of Environmental Licensing and Permit Status

Permit / License No.	Valid Period		Summary	Status
	From	To		
Environmental Permit (EP)				
EP-319/2009/D	28/01/2014	N/A	Operation of • a biochemical plant with a storage capacity of more than 500 tonnes and in which substances are processed and produced; • a storage, transfer and transhipment of oil facility with a storage capacity of not less than 1,000 tonnes; and • a dangerous goods godown with a storage capacity exceeding 500 tonnes	Valid
Water Pollution Control Ordinance (WPCO) Licence				
WT00022972-2015	16/12/2015	31/12/2017	Discharge of • effluent from wastewater treatment facilities to communal foul sewer; and • effluent from floor washing of operation areas to communal storm drain	Valid

3 ENVIRONMENTAL MONITORING REQUIREMENTS

Air Quality

3.1 According to Section 4.3 of the Final EM&A Manual of the Project, the emission from stacks of boiler, biogas flare and process building, and odour concentrations at the final air scrubber shall be monitored. Odour patrols along the Project Site boundary is also required.

3.2 Monitoring criteria (i.e. frequency, parameter, and action & limit levels) for the emission of the boiler stack, biogas flare and process building are listed in **Table 3-1**, while criteria for odour concentrations at the final air scrubber and odour patrols along the Project Site boundary are listed in **Table 3-2**.

Table 3-1 Monitoring Criteria for the Emission from Stacks of Boiler, Biogas Flare and Process Building

Stack	Frequency *	Parameter	Limit Levels**
Boiler	Monthly for the first 12 months of operation. If the monitoring results of the first year monitoring meet the limit level, the monitoring will be reduced to half-yearly intervals for the whole operational stage.	Nitrogen oxides (NO_X)	0.66 g/s (based on volume of oil consumed)
		Carbon monoxide (CO)	0.17g/s (based on volume of oil consumed)
		Sulphur dioxide (SO_2)	0.24g/s (based on volume of oil consumed)
		Non-methane Organic Compounds (NMOC)	1.13×10^{-2} g/s (if biogas is burnt) at 0 ^oC, 1 atm
		Exhaust gas velocity	7 m/s (minimum)
Biogas Flare		NO_X	0.015 g/s
		CO	0.005 g/s
		SO_2	1.07×10^{-3} g/s
		NMOC	4.9×10^{-4} g/s
		Exhaust gas velocity	0.54 m/s (minimum)
Process Building		Acetyldehyde	0.028 g/s
		Methanol	0.028 g/s
		Exhaust gas velocity	0.79 m/s (minimum)

* Monitoring will not be carried out during raining days

** No action level is set in the Final EM&A Manual of the Project

Table 3-2 Monitoring Criteria for the Odour Concentrations at the Final Air Scrubber and Odour Patrols along the Project Site Boundary

	Frequency	Parameter	Action Levels	Limit Levels
Odour Concentrations at the Final Air Scrubber	Monthly for the first 2 years of operation *	Odour Exhaust gas velocity	– **	200.3 OU/s 0.7 m/s (minimum)
Odour Patrols along the Project Site Boundary	Two times a day, one in the morning and one in the afternoon • Monthly for the first 12 months of operation. If the monitoring results of the first year monitoring meet the limit level, the monitoring frequency will be reduced to quarterly intervals in the second year; • If the action level is triggered during the second year of operation, the frequency will be resumed to monthly intervals until compliance with the action level for three consecutive months is obtained; • If the action level is not triggered for four consecutive quarterly monitoring, the monitoring can be terminated.	Odour Intensity	• Odour intensity ≥ Class 2 recorded; or • One documented complaint received	• Odour intensity ≥Class 3 recorded on 2 consecutive patrols

* Monitoring will not be carried out during raining days

** No action level was set in the Final EM&A Manual of the Project

3.3 If action / limit levels are exceeded, the following actions should be taken by the ET:

- Inform Project Proponent and IEC, and investigate and record the cause of exceedance within 24 hours;
- Repeat measurement to confirm findings; and
- Implement the event and action plan as shown in **Table 3-3**.

Table 3-3 Event and Action Plan for Air Quality Monitoring

Event	Actions		
	ET Leader	**IEC**	**Project Proponent**
Exceedance of Limit Level for stack emission from boiler, biogas flare, process building and final air scrubber	• Repeat measurement to confirm finding • Identify source(s) and investigate the cause(s) of exceedance • Inform Project Proponent whether the cause of exceedance is due to the Project • Prepare the Notification of Exceedance within 24 hours • Discuss remedial actions with the Project Proponent • Assess the effectiveness of Project Proponent's remedial actions • For the monitoring of emissions from the stacks of the boiler, biogas flare and process building, increase the monitoring frequency from half-yearly (for the second year onward) to monthly intervals. If results of three consecutive monthly monitoring show no exceedance of the limit level, the monitoring frequency will be reverted back to half-yearly intervals.	• Verify the Notification of Exceedance submitted by the ET Leader • Check with the Project Proponent on the operating activities and implementation of control measures • Discuss with ET Leader and Project Proponent on the possible remedial actions • Advise the Project Proponent on the effectiveness of the proposed remedial measures • Supervise implementation of remedial measures	• Rectify any unacceptable practice • Amend working methods as required • Implement amended working methods, if necessary
Exceedance of Action Level for odour	• Identify source(s) / reason of exceedance or complain • Prepare the odour complain form or the Notification of Exceedance within 24 hours • Inform Project Proponent whether the cause of exceedance is due to the Project • Discuss remedial actions with the Project Proponent • During the second year of operation, if the action level is triggered, the frequency will be resumed to monthly until compliance with the action level for three consecutive months is obtained and the frequency will be reduced to quarterly intervals thereafter.	• Verify the Notification of Exceedance submitted by the ET Leader	• Rectify any unacceptable practice • Amend working methods as required • Implement amended working methods, if necessary

Event	Actions		
	ET Leader	**IEC**	**Project Proponent**
Exceedance of Limit Level for odour	• Identify source(s) / reason of exceedance or complain • Prepare the odour complain form or the Notification of Exceedance within 24 hours • Inform Project Proponent whether the cause of exceedance is due to the Project • Assess the effectiveness of Project Proponent's remedial actions or amended design	• Verify the Notification of Exceedance submitted by the ET Leader • Check with the Project Proponent on the operating activities and implementation of control measures • Discuss with ET Leader and Project Proponent on the possible remedial actions • Advise the Project Proponent on the effectiveness of the proposed remedial measures • Supervise implementation of remedial measures	• Rectify any unacceptable practice • Propose and implement remedial measures or amend design as required within 3 working days of notification • Resubmit proposals if problem still not under control

Water Quality

3.4 According to Section 6.3 of the Final EM&A Manual of the Project, the water quality of treated effluent discharged from Project Site and stormwater discharge shall be monitored.

3.5 Monitoring criteria (i.e. frequency, parameter, and limit levels) for the water quality of treated effluent discharged from Project Site and stormwater discharge are listed in **Table 3-4**.

Table 3-4 Monitoring Criteria for the Water Quality of Treated Effluent Discharged from Project Site and Stormwater Discharge

Discharge	Frequency	Parameter	Limit Levels*
Treated Effluent Discharged from Project Site	Monthly	pH	Within the range of 6 - 10
		Suspended Solids	800 mg/L
		Biochemical Oxygen Demand (BOD) (5 days, 20 ^{o}C)	800 mg/L
		Chemical Oxygen Demand (COD)	2000 mg/L
		Oil & Grease	50 mg/L
		Sulphate	1000 mg/L
		Total Nitrogen	200 mg/L
		Total Phosphorus	50 mg/L
Stormwater Discharge	Quarterly	pH	Within the range of 6 – 9
		Suspended Solids	50 mg/L
		Biochemical Oxygen Demand (BOD) (5 days, 20 ^{o}C)	50 mg/L
		Chemical Oxygen Demand (COD)	100 mg/L
		Oil & Grease	30 mg/L
* No action level was set in the WPCO Licence			

3.6 If limit levels are exceeded, the following actions should be taken by the ET:

- Inform Project Proponent and IEC, and investigate and record the cause of exceedance within 24 hours;
- Repeat measurement to confirm findings; and
- Implement the event and action plan as shown in **Table 3-5**.

Table 3-5 Event and Action Plan for Water Quality Monitoring

Event	Actions		
	ET Leader	**IEC**	**Project Proponent**
Exceedance of Limit Level for Treated Effluent Discharged from Project Site	• Identify source(s) and investigate the cause(s) of exceedance • Repeat measurement to confirm finding • Prepare the Notification of Exceedance within 24 hours • Discuss remedial actions with the Project Proponent • Assess the effectiveness of Project Proponent's remedial actions	• Verify the Notification of Exceedance submitted by the ET Leader • Check with Contractor on the operating activities and implementation of landfill gas control measures • Discuss with ET Leader and Contractor on the possible remedial actions • Advise the IC on the effectiveness of the proposed remedial measures • Supervise implementation of remedial measures	• Check the performance of the on-site WWTP • Rectify any unacceptable performance • Carry out remedial measures or amend design as required • Implement amended design, if necessary
Exceedance of Limit Level for Stormwater Discharged from the Project Site	• Identify source(s) and investigate the cause(s) of exceedance • Repeat measurement to confirm finding • Prepare the Notification of Exceedance within 24 hours • Discuss remedial actions with the Project Proponent • Assess the effectiveness of Project Proponent's remedial actions	• Verify the Notification of Exceedance submitted by the ET Leader • Check with Project Proponent on the operating activities • Discuss with ET Leader and Project Proponent on the possible remedial actions • Advise the Project Proponent on the effectiveness of the proposed remedial measures • Supervise implementation of remedial measures	• Propose and implement remedial measures or amend design as required • Rectify any unacceptable practice • Amend working methods as required • Implement amended working methods, if necessary

Sulphur Content in Bio Heating Oil

3.7 According to Section 3.11 of the EP-319/2009/D, if Bio Heating Oil (BHO) is used on site, the sulphur content in BHO shall be monitored.

3.8 Monitoring criteria (i.e. frequency, parameter, and limit level) for the sulphur content in BHO are listed in **Table 3-6**.

Table 3-6 Monitoring Criteria for Sulphur Content in Bio Heating Oil

Frequency	Parameter	Limit Level*
Every tank load of the BHO for the BHO's sulphur content when the fuel tank(s) is being filled/refilled • This original frequency shall be adopted in the first three months of using BHO on site. After the first three months of the original monitoring regime, if all monitoring result in the first three months meet the limit level, the frequency may be reduced to one test for every two refills for the next three months; and after the first six months, the monitoring may be conducted once a month. • If exceedance occur, the monitoring shall be reverted to the original frequency of a test for every tank load of BHO, or at such a monitoring frequency to be advised and agreed by the EPD's Director.	Sulphur Content	346 ppm
* No action level was set in the EP of the Project		

3.9 If limit level is exceeded, the following actions should be taken by the ET:

- Inform Project Proponent and IEC within 24 hours;
- Repeat measurement to confirm findings;
- Inform Project Proponent to increase the use of low sulphur diesel in the fuel tank(s) to achieve a fuel mixture with sulphur content of less than 346 ppm; and
- Revert the monitoring programme to the original frequency of a test for every tank load of BHO, or at such a monitoring frequency to be advised and agreed by the EPD's Director.

4 MONITORING METHODOLOGY

Air Quality

Emission from Stacks of Boiler, Biogas Flare

4.1 Emissions from the stack of boiler and from the stack of biogas flare were sampled and analyzed. Methods adopted for analysis are listed in **Table 4-1**. Detailed monitoring methodologies for emissions from the stack of boiler and from the stack of biogas flare are presented in **Appendix A** and in **Appendix B** respectively.

Table 4-1 Methodologies for Monitoring of Emission from Stacks of Boiler and Biogas Flare

Parameter	Methodology
Nitrogen oxides (NOx)	USEPA Method 7C
Carbon monoxide (CO)	USEPA Method 10B
Sulphur dioxide (SO_2)	USEPA Method 6
Non-methane organic compounds (NMOC)	USEPA Method TO-12
Exhaust gas velocity	USEPA Method 2

Emission from Stack of Process Building

4.2 Emission from the stack of process building was sampled and analyzed. Methods adopted for analysis are listed in **Table 4-2**. Detailed monitoring methodology for emission from the stack of process building is presented in **Appendix C**.

Table 4-2 Methodologies for Monitoring of Emission from Stack of Process Building

Parameter	Methodology
Acetaldehyde	USEPA Method TO-11A
Methanol	USEPA Method TO-14A
Exhaust gas velocity	USEPA Method 2

Odour Concentrations at the Final Air Scrubber

4.3 Gas in the final air scrubber was sampled and analyzed. Methods adopted for analysis are listed in **Table 4-3**. Detailed methodology for odour monitoring in the final air scrubber is presented in **Appendix D**.

Table 4-3 Methodologies for Monitoring of Odour Concentrations at the Final Air Scrubber

Parameter	Methodology
Odour concentration	European Standard Method (EN13725)
Exhaust gas velocity	USEPA Method 2

Odour Patrols along Site Boundary

4.4 Odour patrols were carried out by a qualified odour panelist in both morning and afternoon on 12 May 2016. During odour patrol, the panelist identified the odour nature and determined the odour intensity, which is expressed using an odour intensity scale, at all 5 selected locations. Weather conditions including prevailing weather, wind direction and wind speed were also recorded. Detailed methodology for odour patrol is presented in **Appendix E**.

Water Quality

Water Quality of Treated Effluent Discharged from Project Site

4.5 Treated effluent discharged from Project Site was sampled and analyzed. Methodologies for water quality monitoring were followed either American Public Health Association's (APHA's) "Standard Methods for the Examination of Water & Wastewater" or Hach Method, which are listed in **Table 4-4**. In addition to the parameters listed in **Table 4-4**, pH was measured.

Table 4-4 Methodologies for Water Quality Monitoring of Treated Effluent Discharged from Project Site

Parameter	Methodology
Suspended Solids (S.S.)	APHA 2540D
Biochemical Oxygen Demand (BOD) (5 days, 20 ^{o}C)	APHA 5210B
Chemical Oxygen Demand (COD)	Hach Method 8000
Oil & Grease	APHA 5520B

Parameter	Methodology
Suspended Solids (S.S.)	APHA 2540D
Sulphate	Hach Method 10248
Total Nitrogen	Hach Method 10071
Total Phosphorus	Hach Method 8190

Water Quality of Stormwater Discharge

4.6 As water quality of stormwater discharge is required to be monitored quarterly, the next monitoring work will be carried out in June 2016. No monitoring work was carried out in May 2016.

Sulphur Content in Bio Heating Oil

4.7 According to Section 3.11 of the EP-319/2009/D, if Bio Heating Oil (BHO) is used on site, every tank load of the sulphur content in BHO shall be tested when the fuel tank(s) is being filled/refilled for the first three months.

4.8 In May 2016, BHO in the tank was sampled once. Its sulphur content was then analyzed in accordance with EN-ISO-20846:2011 – Determination of sulfur content of automotive fuels – Ultraviolet fluorescence method.

5 MONITORING RESULTS

Air Quality

Emission from Stacks of Boiler

5.1 The monitoring results of the emission from the stack of boiler are presented in **Table 5-1**. No exceedance of Limit Level was reported. Detailed monitoring result of the emission from the stack of boiler is presented in **Appendix A**.

Table 5-1 Monitoring Result of the Emission from the Stack of Boiler

Parameter	Limit Level	Monitoring Result*
Nitrogen oxides (NO_X)	0.66 g/s	0.44 g/s
Carbon monoxide (CO)	0.17g/s	< 0.056 g/s
Sulphur dioxide (SO_2)	0.24g/s	< 0.0083 g/s
Non-methane Organic Compounds (NMOC)	1.13×10^{-2} g/s	1.10×10^{-2} g/s
Exhaust gas velocity	7 m/s (minimum)	16.125 m/s
* Average result of all trials is presented		

Emission from Stacks of Biogas Flare

5.2 The monitoring results of the emission from the stack of biogas flare are presented in **Table 5-2**. Detailed monitoring result of the emission from the stack of biogas flare is presented in **Appendix B**.

5.3 2 exceedances of Limit Level were reported. The exceedances are considered due to incomplete combustion. Details of the investigation report is presented in **Appendix J**.

Table 5-2 Monitoring Result of the Emission from the Stack of Biogas Flare

Parameter	Limit Level	Monitoring Result*
Nitrogen oxides (NO_X)	0.015 g/s	< 0.0014 g/s
Carbon monoxide (CO)	0.005 g/s	0.014 g/s **
Sulphur dioxide (SO_2)	1.07×10^{-3} g/s	$< 0.833 \times 10^{-3}$ g/s
Non-methane Organic Compounds (NMOC)	4.9×10^{-4} g/s	5.1×10^{-4} g/s **
Exhaust gas velocity	0.54 m/s (minimum)	1.4 m/s
* Average result of all trials is presented ** Exceedance of Limit Level		

Emission from Stacks of Process Building

5.4 The monitoring results of the emission from the stack of process building are presented in **Table 5-3**. No exceedance of Limit Level was reported. Detailed monitoring result of the emission from the stack of process building is presented in **Appendix C**.

Table 5-3 Monitoring Result of the Emission from the Stack of Process Building

Parameter	Limit Level	Monitoring Result*
Acetyldehyde	0.028 g/s	< 0.00028 g/s
Methanol	0.028 g/s	0.00417 g/s
Exhaust gas velocity	0.79 m/s (minimum)	1.9 m/s
* Average result of all trials is presented		

Odour Concentrations at the Final Air Scrubber

5.5 The monitoring result of the odour concentrations at the final air scrubber is presented in **Table 5-4**. No exceedance of Limit Level was reported. Detailed monitoring result of the odour concentrations at the final air scrubber is presented in **Appendix D**.

Table 5-4 Monitoring Result of the Odour Concentrations at the Final Air Scrubber

Parameter	Limit Level	Monitoring Result*
Odour	200.3 OU/s	5.725 OU/s
Exhaust gas velocity	0.7 m/s (minimum)	0.75 m/s
* Average result of all trials is presented		

Odour Patrols along Site Boundary

5.6 The monitoring result of the odour patrol is presented in **Table 5-5**. No exceedance of Action and Limit Levels was reported. Detailed monitoring result of odour patrols along site boundary is presented in **Appendix E**.

Table 5-5 Monitoring Result of Odour Patrols along Site Boundary

Patrol Time	Location	Odour Intensity		
		Action Level	Limit Level	Measured Level (Odour Nature)
Morning	1	Odour intensity ≥Class 2 recorded	Odour intensity ≥Class 3 recorded on 2 consecutive patrols	1 (Oil and grease)
	2			1 (Oil and grease)
	3			0
	4			0~1 (Oil and grease)
	5			0
Afternoon	1			0~1 (Oil and grease)
	2			1 (Oil and grease)
	3			0
	4			1 (Food smell)
	5			0

Water Quality

Water Quality of Treated Effluent Discharged from Project Site

5.7 The water quality monitoring result of treated effluent discharged from Project Site is presented in **Table 5-6**. No exceedance of Limit Level was reported. Detailed water quality monitoring result of treated effluent discharged from Project Site is presented in **Appendix F**.

Table 5-6 Water Quality Monitoring Result of Treated Effluent Discharged from Project Site

Parameter	Limit Level	Monitoring Result
pH	Within the range of 6 - 10	7.73
Suspended Solids	800 mg/L	760 mg/L
Biochemical Oxygen Demand (BOD) (5 days, 20 ^{o}C)	800 mg/L	779 mg/L
Chemical Oxygen Demand (COD)	2000 mg/L	1800 mg/L
Oil & Grease	50 mg/L	42 mg/L
Sulphate	1000 mg/L	10 mg/L
Total Nitrogen	200 mg/L	160 mg/L
Total Phosphorus	50 mg/L	44 mg/L

Water Quality of Stormwater Discharge

5.8 Water quality of stormwater discharge was not monitored in May 2016 (see **Section 4.6** for details).

Sulphur Content in Bio Heating Oil

5.9 The monitoring result of sulphur content in Bio Heating Oil is presented in **Table 5-7**. No exceedance of Limit Level was reported. Detailed monitoring result of sulphur content in Bio Heating Oil is presented in **Appendix H**.

Table 5-7 Monitoring Result of Sulphur Content in Bio Heating Oil

Sampling Date	Limit Level	Monitoring Result
25 May 2016	346 ppm	335 ppm

6 SUMMARY OF COMPLAINT AND PROSECUTION

6.1 No environmental related complaint, prosecution or notification of summon was received in May 2016.

6.2 There was no environmental complaint, prosecution or notification of summons received since the commencement of Project (operational phase). The Complaint Log is attached in **Appendix I**.

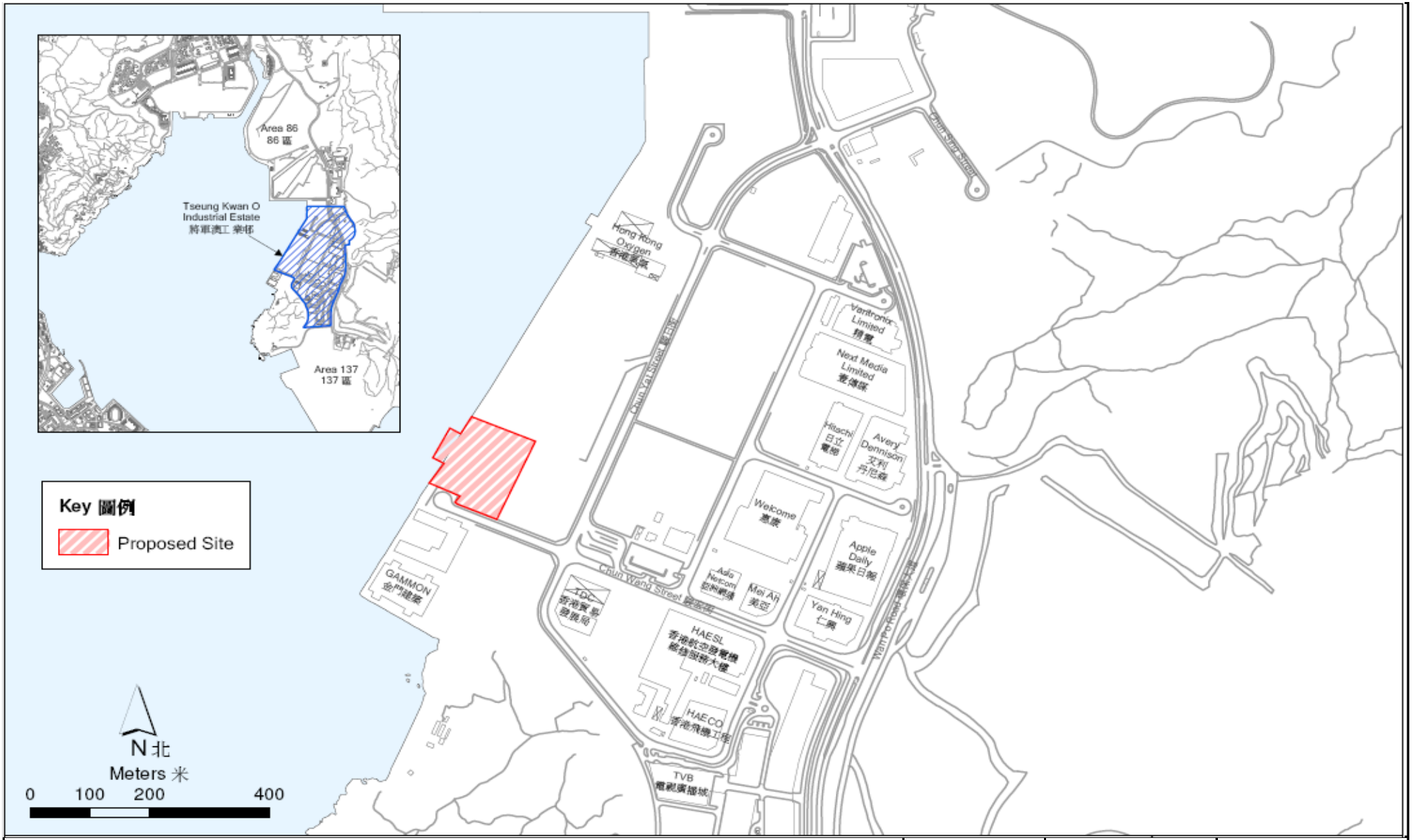
7 CONCLUSIONS

7.1 In May 2016, environmental monitoring and audit works were carried out in accordance with criteria and requirements listed in the Project EM&A Manual, Environmental Permit EP-319/2009D, and Water Pollution Control Ordinance Licence WT00022972-2015.

7.2 Monitoring of air quality, water quality and sulphur content in Bio Heating Oil were carried out at designated locations. 2 exceedances of Limit Levels were recorded at the stack of biogas flare. Investigation for the exceedance events was carried out, and measures were recommended to counter the exceedance events.

7.3 No environmental related complaint, prosecution or notification of summon was received.

FIGURES



Title: Development of a Biodiesel Plant at Tseung Kwan O Industrial Estate	Scale: N.T.S	Project No.: MA15052	CINOTECH
Location Plan	Date: MAY 2016	Figure: 1.1	

APPENDIX A
Air Quality Monitoring Report – Emission from Stack Of Boiler

ALS Technichem (HK) Pty Ltd
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STACK GAS SAMPLING AND LABORATORY TESTING REPORT

Location: ASB Biodiesel (Hong Kong) Ltd

Sampling Period: 23rd May, 2016

ALS Work Order No: HK1619871

Report Issue Date: 15th June, 2016

CLIENT:
ASB Biodiesel (Hong Kong) Ltd

No. 22, Chun Wang Street,
Tseung Kwan O Industrial Estates, N.T.,
Hong Kong
Tel: 852-3741-1640
Fax: 852-3183-4200

PREPARED BY:

Mr Fung Lim Chee, Richard
General Manager - Hong Kong

This is the Final Report and supersedes any preliminary report with this batch number.

Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release.

1 Summary of Work

The document is the final report for the stack gas sampling and testing events in ASB Biodiesel (Hong Kong) Ltd.

Sampling Period: 23rd May, 2016
Location of Stack: Tseung Kwan O Industrial Estates
No. of Stack: 1
Name of Stack: Boiler (EP2)

1.1 Method for Stack Sampling and Analysis

Parameter	USEPA Method Reference
Velocity / Volumetric Flow Rate	Method 2
Nitrogen / Oxygen / Carbon Dioxide	Method 3
Moisture Content	Method 4
Sulphur Dioxide (SO_2)	Method 6
Nitrogen Oxides (NO_x)	Method 7C
Carbon Monoxide (CO)	Method 10B
Non-Methane Organic Compounds (NMOC)	Method TO-12
Respirable Suspended Particulates (PM_{10})	Method 201A

1.2 Sampling Time

Each gas sample, except carbon monoxide and non-methane organic compounds, was covered for at least 1 hour.
For the measurement of carbon monoxide and non-methane organic compounds, the sampling was last for at least 30 minutes.

2 Sampling Summary

2.1 Nitrogen Oxides (NO_x)

USEPA Method 7C will be used for sampling and testing of nitrogen oxides (NO_x) sample. Stack gas with nitrogen oxides (NO_x) analyte will be collected from the centroid of the stack into impinger contains absorption solution (alkaline potassium permanganate solution) via regulated gas sampler. Sample will be delivered to ALS Hong Kong Laboratory and analysed colorimetrically.

2.2 Sulphur Dioxide (SO_2)

USEPA Method 6 will be used for sampling and testing of sulphur dioxide (SO_2) sample. Stack gas with sulphur dioxide (SO_2) analyte will be collected from the centroid of the stack into impinger contains absorption solution (3 percent H2O2 solution) via regulated gas sampler. Sample will be delivered to ALS Hong Kong Laboratory and analysed by the ion chromatography method.

2.3 Carbon Monoxide (CO)

USEPA Method 10B will be used for sampling and testing of carbon monoxide (CO) sample. Stack gas with carbon monoxide (CO) analyte will be collected from the centroid of the stack into a Tedlar Bag via regulated gas sampler. Sample will be delivered to ALS Hong Kong Laboratory and analysed by the gas chromatography flame ionization detection (GC/FID).

2.4 Non-Methane Organic Compounds (NMOC)

USEPA Method TO-12 will be used for sampling and testing of Non-Methane Organic Compounds (NMOC) sample. Stack gas with carbon monoxide (CO) analyte will be collected from the centroid of the stack into a 6L Canister via regulated gas sampler.

The sampling period will last for around 30 mins to collect sufficient sample for laboratory analysis. The duration depends on the stack condition such as pressure, temperature. Sample will be delivered to ALS Hong Kong Laboratory and analysed by the gas chromatography flame ionization detection (GC/FID), the result of NMOC will be reported as “propane”.

2.5 Respirable Suspended Particulates (PM_{10})

USEPA Method 201A will be used for sampling and testing of Respirable Suspended Particulates (PM10) sample. The Respirable Suspended Particulates sample shall be collected at a predetermined constant flow rate through an in-stack sizing device with filter paper, a glass-made probe, and a series of impingers containing distilled water absorbing solution at different traverse points along the two sampling port axis as required in the USEPA Method 1& 2. The particulate content shall be determined gravimetrically in laboratory.

3 Sampling Period and Stack Parameter

3.1 Sampling Period

Test Parameter	Trial 1	Trial 2
Sulphur Dioxide (SO_2)	23rd May,2016 11:19 - 12:19	23rd May,2016 15:32 - 16:32
Nitrogen Oxides (NOx)	23rd May,2016 12:22 - 13:22	23rd May,2016 14:30 - 15:30
Respiralde Suspended Particulates (PM_{10}) and Total Particulates (PM_{total})	23rd May,2016 13:27 - 13:57	23rd May,2016 13:58 - 14:28
Carbon Monoxide (CO) & Non-Methane Organic Compounds (NMOC)	23rd May,2016 13:27 - 13:57	23rd May,2016 13:58 - 14:28

3.2 Stack Parameter

Test Parameter	Trial	Sampling Volume (m^3)[1]	Stack Gas Temperature (°C)	Stack Gas Velocity (m/s)	Minimum Flow Rate (m^3/hr)[1]	Moisture Content (%)
SO_2	1	0.0556	205	16	11320	12.6
	2	0.0582	201	16	11648	11.4
NO_x	1	0.0255	205	17	11051	12.6
	2	0.0251	205	16	9402	11.4
PM_{10} & PM_{total}	1	0.8823	202	13	9508	12.6
	2	0.8884	183	13	10322	11.4
CO	1	0.0086	203	16	12116	12.6
	2	0.0086	202	16	11060	11.4
NMOC	1	0.006	203	16	12116	12.6
	2	0.006	202	16	11060	11.4

Note:
[1]: Results expressed as at 0 degree Celsius temperature, 101.325 kilopascals pressure, without correction for water vapour or oxygen content.

4 Result

4.1 Boiler (EP2)

Test Parameter	Unit	LOR	Result[1]	
			Trial 1	Trial 2
Nitrogen Oxides (NO_x) Incl. Nitrogen Dioxide & Nitrogen Oxide[2]	ppmv	2	72	80
	mg/m^3	5	147	164
	kg/hr[4] [5]	0.05	1.63	1.55
Carbon Monoxide (CO)	ppmv	10	<10	<10
	mg/m^3	13	<13	<13
	kg/hr[4] [5]	0.2	<0.2	<0.2
Sulphur Dioxide (SO_2)	ppmv	1.0	<1.0	<1.0
	mg/m^3	2.0	<2.0	<2.0
	kg/hr[4] [5]	0.03	<0.03	<0.03
Non-Methane Organic Carbon (NMOC)[3]	ppmv	0.2	8.2	4.4
	mg/m^3	0.1	4.4	2.4
	kg/hr[4] [5]	0.001	0.053	0.026
Respirable Suspended Particulates (PM_{10})	mg/m^3	5.0	<5.0	<5.0
	kg/hr[4] [5]	0.06	<0.06	<0.06
Total Particulates (PM_{total})	mg/m^3	5.0	<5.0	<5.0
	kg/hr[4] [5]	0.06	<0.06	<0.06

Note:
[1]: Results expressed as at 0 degree Celsius temperature, 101.325 kilopascals pressure, without correction for water vapour or oxygen content. The introduction of dilution air to achieve the limit is not allowed.
[2]: Results expressed as nitrogen dioxide.
[3]: Results expressed as carbon.
[4]: The LOR of the emission rate (kg/hr) is calculated based on the minimum flow rate among the 2 sampling trials.
[5]: The emission rate (kg/hr) is calculated based on the minimum flow rate during sampling.
LOR: Laboratory Reporting Limit

APPENDIX B
Air Quality Monitoring Report – Emission from Stack of Biogas Flare

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STACK GAS SAMPLING AND LABORATORY TESTING REPORT

Location: ASB Biodiesel (Hong Kong) Ltd

Sampling Period: 24th May, 2016

ALS Work Order No: HK1619869

Report Issue Date: 15th June, 2016

CLIENT:
ASB Biodiesel (Hong Kong) Ltd

No. 22, Chun Wang Street,
Tseung Kwan O Industrial Estates, N.T.,
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PREPARED BY:

Mr Fung Lim Chee, Richard
General Manager - Hong Kong

This is the Final Report and supersedes any preliminary report with this batch number.

Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release.

1 Summary of Work

The document is the final report for the stack gas sampling and testing events in ASB Biodiesel (Hong Kong) Ltd.

Sampling Period: 24th May, 2016
Location of Stack: Tseung Kwan O Industrial Estates
No. of Stack: 1
Name of Stack: Biogas Flare (EP1)

1.1 Method for Stack Sampling and Analysis

Parameter	USEPA Method Reference
Velocity / Volumetric Flow Rate	Method 2
Sulphur Dioxide (SO_2)	Method 6
Nitrogen Oxides (NO_x) Incl. Nitrogen Dioxide & Nitrogen Oxide	Method 7C
Carbon Monoxide (CO)	Method 10B
Non-Methane Organic Compounds (NMOC)	Method TO-12

1.2 Sampling Time

Each gas sample, except carbon monoxide and non-methane organic compounds, was covered for at least 1 hour.
For the measurement of carbon monoxide and non-methane organic compounds, the sampling was last for at least 30 minutes.

2 Sampling Summary

2.1 Sulphur Dioxide (SO_2)

USEPA Method 6 will be used for sampling and testing of sulphur dioxide (SO_2) sample. Stack gas with sulphur dioxide (SO_2) analyte will be collected from the centroid of the stack into impinger contains absorption solution (3 percent H_2O_2 solution) via regulated gas sampler. Sample will be delivered to ALS Hong Kong Laboratory and analysed by the ion chromatography method.

2.2 Nitrogen Oxides (NO_x)

USEPA Method 7C will be used for sampling and testing of nitrogen oxides (NOx) sample. Stack gas with nitrogen oxides (NO_x) analyte will be collected from the centroid of the stack into impinger contains absorption solution (alkaline potassium permanganate solution) via regulated gas sampler. Sample will be delivered to ALS Hong Kong Laboratory and analysed colorimetrically.

2.3 Carbon Monoxide (CO)

USEPA Method 10B will be used for sampling and testing of carbon monoxide (CO) sample. Stack gas with carbon monoxide (CO) analyte will be collected from the centroid of the stack into a Tedlar Bag via regulated gas sampler. Sample will be delivered to ALS Hong Kong Laboratory and analysed by the gas chromatography flame ionization detection (GC/FID).

2.4 Non-Methane Organic Compounds (NMOC)

USEPA Method TO-12 will be used for sampling and testing of Non-Methane Organic Compounds (NMOC) sample. Stack gas with carbon monoxide (CO) analyte will be collected from the centroid of the stack into a 6L Canister via regulated gas sampler.

The sampling period will last for around 30 mins to collect sufficient sample for laboratory analysis. The duration depends on the stack condition such as pressure, temperature. Sample will be delivered to ALS Hong Kong Laboratory and analysed by the gas chromatography flame ionization detection (GC/FID), the result of NMOC will be reported as “propane”.

3 Sampling Period and Stack Parameter

3.1 Sampling Period

Test Parameter	Trial 1	Trial 2
Sulphur Dioxide (SO_2)	24th May,2016 10:45 - 11:45	24th May,2016 14:21 - 15:21
Nitrogen Oxides (NO_x)	24th May,2016 11:51 - 12:51	24th May,2016 15:28 - 16:28
Carbon Monoxide (CO)	24th May,2016 13:04 - 13:34	24th May,2016 13:41 - 14:11
Non-Methane Organic Compounds (NMOC)	24th May,2016 13:04 - 13:34	24th May,2016 13:41 - 14:11

3.2 Stack Parameter

Test Parameter	Trial	Sampling Volume (m^3)[1]	Average Stack Gas Temperature (°C)	Average Stack Gas Velocity (m/s)	Average Stack Gas Volume Flow Rate (m^3/hr)[1]
Sulphur Dioxide (SO_2)	1	0.0541	287	1.7	2111
	2	0.0545	210	1.0	1508
Nitrogen Oxides (NO_x)	1	0.0260	245	1.4	1852
	2	0.0267	261	2.1	2819
Carbon Monoxide (CO)	1	0.0086	303	1.4	1739
	2	0.0083	274	1.1	1446
Non-Methane Organic Compounds (NMOC)	1	0.006	303	1.4	1739
	2	0.006	274	1.1	1446

Note:
[1]: Expressed as 0 deg. C, 101.325 kilopascal pressure.

4 Result

4.1 Biogas Flare (EP1)

Test Parameter	Unit	LOR	Result[1]	
			Trial 1	Trial 2
Sulphur Dioxide (SO_2)	ppmv	1	<1	<1
	mg/m^3	2	<2	<2
	kg/hr[4]	0.003	<0.003	<0.003
Nitrogen Oxides (NO_x) [2]	ppmv	2	<2	<2
	mg/m^3	5	<5	<5
	kg/hr[4]	0.005	<0.005	<0.005
Carbon Monoxide (CO)	ppmv	10	24	29
	mg/m^3	13	29	36
	kg/hr[4]	0.018	0.051	0.052
Non-Methane Organic Compounds (NMOC) [3]	ppmv	0.2	2.5	1.8
	mg/m^3	0.1	1.3	1.0
	kg/hr[4]	0.0001	0.0023	0.0014

Note:
[1]: Results expressed as at 0 degree Celsius temperature, 101.325 kilopascals pressure, without correction for water vapour or oxygen content. The introduction of dilution air to achieve the limit is not allowed.
[2]: Results expressed as nitrogen dioxide.
[3]: Results expressed as carbon.
[4]: The LOR of the emission rate (kg/hr) is calculated based on the minimum flow rate among the 2 sampling trials.
LOR: Laboratory Reporting Limit.

APPENDIX C
Air Quality Monitoring Report – Emission from Stack of Process Building

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STACK GAS SAMPLING AND LABORATORY TESTING REPORT

Location: ASB Biodiesel (Hong Kong) Ltd

Sampling Period: 24th May, 2016

ALS Work Order No: HK1619872

Report Issue Date: 15th June, 2016

CLIENT:
ASB Biodiesel (Hong Kong) Ltd

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PREPARED BY:

Mr Fung Lim Chee, Richard
General Manager - Hong Kong

This is the Final Report and supersedes any preliminary report with this batch number.

Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release.

1 Summary of Work

The document is the final report for the stack gas sampling and testing events in ASB Biodiesel (Hong Kong) Ltd.

Sampling Period: 24th May, 2016
Location of Stack: Tseung Kwan O Industrial Estates
No. of Stack: 1
Name of Stack: Process Building Outlet (EP3)

1.1 Method for Stack Sampling and Analysis

Parameter	USEPA Method Reference
Velocity / Volumetric Flow Rate	Method 2
Acetaldehyde	Method TO-11A
Methanol	Method TO-14A

1.2 Sampling Time

The sampling time of each gas sample was covered for at least 1 hour.

2 Sampling Summary

2.1 Acetaldehyde

USEPA Method TO-11A will be used for sampling and testing of Acetaldehyde sample. Stack gas with Acetaldehyde analyte will be collected from the centroid of the stack into DNPH-coated silica gel cartridges via regulated gas sampler. Sample will be delivered to ALS Hong Kong Laboratory and analysed by the liquid chromatography with ultraviolet (UV) detection.

2.2 Methanol

USEPA Method TO-14A will be used for sampling and testing of Methanol sample. Stack gas with Methanol analyte will be collected from the centroid of the stack into a 6L Canister via regulated gas sampler.

The sampling period will last for around 60 mins to collect sufficient sample for laboratory analysis. The duration depends on the stack condition such as pressure, temperature. Sample will be delivered to ALS Hong Kong Laboratory and analysed by the gas chromatography flame ionization detection (GC/FID).

3 Sampling Period and Stack Parameter

3.1 Sampling Period

Test Parameter	Trial 1	Trial 2
Acetaldehyde	24th May,2016 17:43 – 18:43	24th May,2016 18:45 – 19:45
Methanol	24th May,2016 17:43 – 18:43	24th May,2016 18:45 – 19:45

3.2 Stack Parameter

Test Parameter	Trial	Sampling Volume (m^3)[1]	Stack Gas Temperature (°C)	Stack Gas Velocity (m/s)	Stack Gas Volume Flow Rate (m^3/hr)[1]
Acetaldehyde	1	0.0528	40.9	1.9	106
	2	0.0556	41.2	1.9	106
Methanol	1	0.006	40.9	1.9	106
	2	0.006	41.2	1.9	106

Note:
[1]: Expressed as 0 deg. C, 101.325 kilopascal pressure.

4 Result

4.1 Process Building Outlet (EP3)

Test Parameter	Unit	LOR	Result[1]	
			Trial 1	Trial 2
Acetaldehyde	ppmv	2.5	<2.5	<2.5
	mg/m^3	5	<5	<5
	kg/hr	$1x10^{-3}$	$<1x10^{-3}$	$<1x10^{-3}$
Methanol	ppmv	50	102	<50
	mg/m^3	70	146	<70
	kg/hr	0.01	0.02	<0.01

Note:
[1]: Results expressed as at 0 degree Celsius temperature, 101.325 kilopascals pressure, without correction for water vapour or oxygen content. The introduction of dilution air to achieve the limit is not allowed.
LOR: Laboratory Reporting Limit

APPENDIX D
Air Quality Monitoring Report – Odour Measurement at Final Air Scrubber

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VTC 機構成員

For ASB Biodiesel (Hong Kong) Limited

Odour Measurement at ASB Biodiesel Plant

23 May 2016

By Odour Research Centre

Faculty of Science and Technology
Technological and Higher Education Institute of Hong Kong

(*Member of VTC Group*)

1. Background

An odour assessment service was required by ASB Biodiesel (Hong Kong) Limited to collect odour samples at the final air scrubber and to conduct laboratory olfactometry analysis with the European Standard Method (EN13725).

2. Scope of the Work

The scope of the work is:

One sampling location was previously identified by the client. A total of two odour samples need to be collected at final air scrubber per month for a period of one year and the monthly report need to be submitted to the client.

. to collect two odour samples at the final air scrubber and deliver the collected samples to laboratory for olfactometry analysis on 23 May 2016.

. to conduct laboratory olfactometry analysis to determine the odour concentration of the collected odour samples;

. to calculate the odour emission rate at the final air scrubber;

. to prepare an analytical report.

3. Methodology

3.1 Odour Sampling

Odour gas sample is collected by a Sampling Device Standard consists of a vacuum container, which is evacuated by a vacuum pump. The sampling point and the standard sampler are connected by a probe. Due to the evacuation in the sampling device, the sample bag, inside the device, sucks in sample air via the probe. During this process, none of its components come into contact with the sample air due to the construction of the sampling device.

Odour Sampling System

3.2 Odour Measurement by Olfactometry

Odour concentration is determined by a Dynamic Olfactometer (TO9) in accordance with the European Standard Method (EN13725). This European Standard specifies a method for the objective determination of the odour concentration of a gaseous sample using dynamic olfactometry with human assessors and the emission rate of odours emanating from point sources, area sources with outward flow and area sources without outward flow. This European Standard is applicable to the measurement of odour concentration of pure substances, defined mixtures and undefined mixtures of gaseous odorants in air or nitrogen, using dynamic olfactometry with a panel of human assessors being the sensor. The unit of measurement is the odour unit percubic metre: OU_E/m^3. The odour concentration is measured by determining the dilution factor required to reach the detection threshold. The odour concentration at the detection threshold is defined as 1 OU_E/m^3. The odour concentration is then expressed in terms of multiples of the detection threshold. The range of measurement is typically from 2^2 OU_E/m^3 to 2^{17} OU_E/m^3 (excluding pre-dilution).

Olfactometer

3.3 Determination of Odour Emission Rate

The odour emission rate (OER) at the final air scrubber can be calculated by the following equation:

OER (ou/s) = Odour concentration (ou/m^3) x Cross section area of outlet (m^2) x Outlet gas flow velocity (m/s).

4. Odour Sampling and Olfactometry Measurement

4.1 Sampling Activities

The odour sampling works was conducted on 23 May 2016 at the final air scrubber. A total of two odour samples were collected on the site and delivered to the Odour Research Centre of THEi immediately.

During the odour sampling, the wind speed was measured on the outlet of final air scrubber. The location description and sampling condition are summarized in Table 1.

Table 1: Summary of sampling condition and results for olfactometry measurement

Location ID	Location description	Date	Time	Type	a (m^2)	V (m/s)	OC (OU_E/m^3)	OER (ou/s)
1	Final air scrubber	23 May. 2016	11:30	A	0.0962	0.75	72.1	5.20
2	Final air scrubber	23 May. 2016	11:35	A	0.0962	0.75	86.6	6.25

Remark: A: Ambient sampling; a: Cross section area of final air scrubber; V: Gas flow velocity from final air scrubber; OC: Odour concentration; OER: Odour emission rate from final air scrubber.

4.2 Olfactometry Measurement and Analytical Results

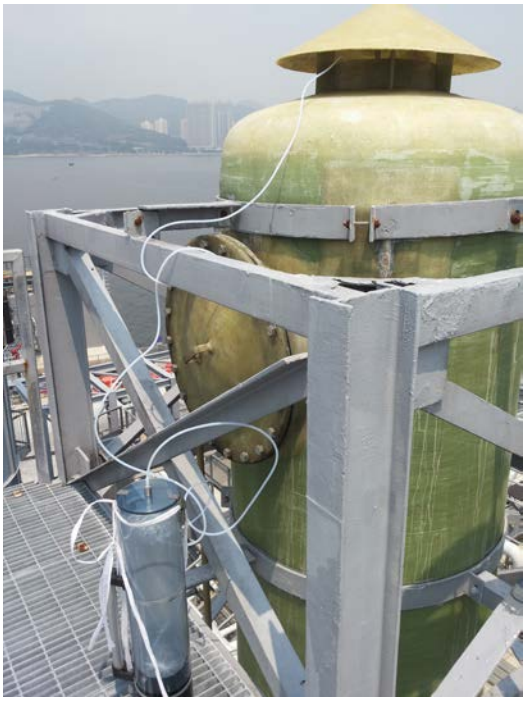
A total of two odour samples were tranported to the Odour Research Centre of THEi. The olfactometry analysis was conducted within 24 hours after the sampling work using a dynamic olfactometer in accordance with the European Standard Method (EN13725). Four qualified panellists participated in the odour testing session, who were previously selected through a set of screening tests using a certified n-butanol gas (60 ppm/v) as a standard reference.

According to the odour concentration determined for each sample, the odour emission rates at the final air scrubber were calculated as follows:

OER (ou/s) = Odour concentration (ou/m^3) x Cross section area of outlet (m^2) x Outlet gas flow velocity (m/s).

The analytical results of odour concentrations and odour emission rateare summarized in Table 1.

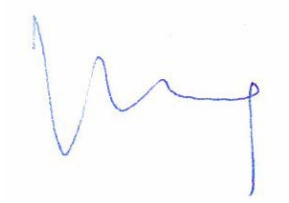
The photo about the on-site sampling activity at the final air scrubber is presented below,



Final air scrubber

Final air scrubber

Prepared by:

KH NG Signed: 

Faculty of Science and Technology
THEi
香港高等科技教育學院
科技學院

Odour Research Centre at THEi

APPENDIX E
Air Quality Monitoring Report – Odour Patrol

Technological and Higher Education Institute of Hong Kong 香港高等科技教育學院

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Member of VTC Group
VTC 機構成員

For ASB Biodiesel (Hong Kong) Limited

Odour Patrol at ASB Biodiesel Plant

12 May 2016

By Odour Research Centre

Faculty of Science and Technology
Technological and Higher Education Institute of Hong Kong

(*Member of VTC Group*)

1. Background

An odour patrol survey was required by ASB Biodiesel (Hong Kong) Limited to determine the odour intensity of ambient air at the boundary of ASB Biodiesel Plant during its operation period of the morning and the afternoon on 12 May 2016.

2. Scope of the Work

The scope of the work is:

This field odour survey includes the daily monitoring by a qualified odour panelist from THEi to record the instant weather conditions, to determine odour intensity and also to identify odour natures at each of five locations along with the boundary of the ASB Biodiesel Plant. The odour patrol exercise should be conducted two times per month for a period of one year and the monthly report need to be submitted to the client.

3. Methodology

3.1 The odour patrol means a simple judgment by observers patrolling and sniffing at the boundary of the ASB Biodiesel Plant to detect any odour at different time within operating hours.

3.2 One qualified odour panelist with his individual thresholds (n-butanol) complied with the requirement of the European Standard Method (EN13725) in the range of 20 to 80 ppb/v and a standard deviation of $R < 2.3$ should be selected to conduct the odour patrol work.

3.3 The panelist should be free from any respiratory diseases and normally do not work at or live in the area in the vicinity of the ASB Biodiesel Plant.

3.4 During each visit, the instant weather conditions should be measured using a portable environment anemometer (Lutron LM-8000) and recorded for references.

3.5 During odour patrol, the panelist should indentify the odour nature and determine the odour intensity at each location. The odour intensity can be expressed using an odour intensity scale, which is a verbal description of an odour sensation to which a numerical value is assigned at five different levels according to the following criteria:

0	Not detected	No odour perceived or an odour so week that it can not be easil characterised or described
1	Slight	Identifiable odour, slight
2	Moderate	Identifiable odour, moderate
3	Strong	Identifiable, strong
4	Extreme	Severe odour

4. Odour Patrol Survey

4.1 Prior to the on-site odour survey, a site visit was conducted by an odour technician from the Odour Research Centre of THEi together with the staff from ASB Biodiesel (Hong Kong) Limited. During the site visit, five locations at the boundary of ASB Biodiesel Plant were identified for the odour patrol survey and are clearly marked in Figure 1.

4.2 One qualified odour panelist from THEi was selected as an observer to conduct the odour patrol, who participated in a set of screening tests using a certified n-butanol gas with their individual thresholds (n-butanol) complied with the requirement of the European Standard Method (EN13725) in the range of 20 to 80 ppb/v and a standard deviation of $R < 2.3$.

4.3 The odour patrol survey was conducted in the morning and the afternoon on 12 May 2016.

4.4 During each survey, the odour panelist recorded the weather conditions including prevailing weather, wind direction and wind speed, determined the odour intensity and also indentified the odour nature at each location.

4.5 Some photos about odour patrol activities at different locations are presented below:

1

2

3

4

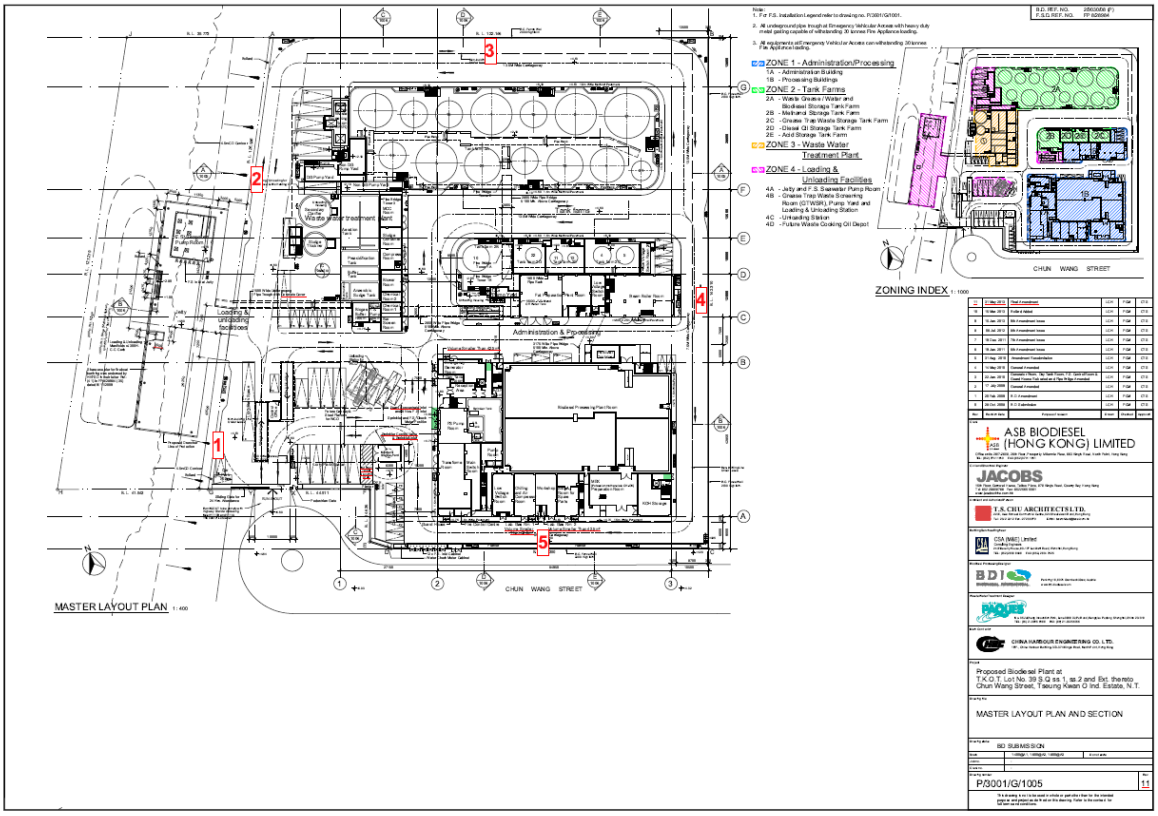
5

4.6 All odour patrol data and findings in two trips on 12 May 2016 are summarized in Table 1 as shown below:

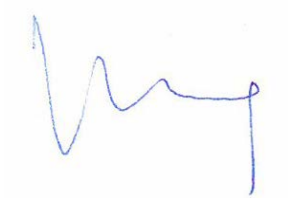
Table 1: Summary of odour patrol survey data and findings

Date	Location	Time	Weather	Wind		Odour	Observations
				Speed (m/s)	Direction	Intensity	Odour Nature
12 May. 2016	1	10:15	Cloudy	0.6	E-NE	1	Oil and Grease
	2	10:19		3.5	E-NE	1	Oil and Grease
	3	10:24		2.2	E-NE	0	
	4	10:29		1.9	E-NE	0~1	Oil and Grease
	5	10:32		1.5	E-NE	0	
	1	12:03	Cloudy	1.1	E-NE	0~1	Oil and Grease
	2	12:06		3.0	E-NE	1	Oil and Grease
	3	12:11		5.2	E-NE	0	
	4	12:16		2.7	E-NE	1	Food Smell
	5	12:19		1.8	E-NE	0	

Figure 1: Seven locations of odour patrol survey at the boundary of ASB Biodiesel Plant



Prepared by:

KH NG Signed: 

Odour Research Centre at THEi

APPENDIX F
Water Quality Monitoring Result – Effluent from Wastewater Treatment Plant

ASB Biodiesel (Hong Kong) Ltd.

No.	:	S301-20160531-0900
Date	:	4 June, 2016
Page	:	1 of 1

TEST REPORT

SAMPLE DESCRIPTION : Stream 1, Water Pollution Control Ordinance (CAP. 358)
Licence No.: WT00022972-2015

SAMPLE RECEIVED DATE : 31 May, 2016

TESTING DATE : 31 May – 4 June, 2016

TEST RESULT :

TEST	METHOD	UNIT	RESULT
pH	/	/	7.73
TCOD	HACH Method 8000	mg/L	1800
Sulfate	HACH Method 10248	mg/L	10
Total Nitrogen (as N)	HACH Method 10071	mg/L	160
Total Phosphorous (as P)	HACH Method 8190	mg/L	44
Total Suspended Solid	APHA 2540 D	mg/L	760
Oil & Grease	APHA 5520 B	mg/L	42
BOD_5	APHA 5210 B	mg/L	779

For and on behalf of
ASB BIODIESEL (HONG KONG) LTD

ASB BIODIESEL (HONG KONG) LIMITED Engineering Department

Authorized Signature

ASB Biodiesel (Hong Kong) Ltd.
No.22 Chun Wang Street,
Tseung Kwan O Industrial Estate,
New Territories, Hong Kong.

APPENDIX H
Test Result – Sulphur Content in Bio Heating Oil

ASB Biodiesel (Hong Kong) Ltd.

No. : T21-20160525-0900
Date : 25 May, 2016
Page : 1 of 1

TEST REPORT

SAMPLE DESCRIPTION : Bio Heating Oil, Tank 21

SAMPLE RECEIVED DATE : 25 May, 2016

TESTING DATE : 25 May, 2016

TEST RESULT :

TEST	METHOD	UNIT	RESULT
Sulphur	EN ISO 20846: 2011	mg/kg	335

For and on behalf of
ASB BIODIESEL (HONG KONG) LTD

Authorized Signature

ASB Biodiesel (Hong Kong) Ltd.
No.22 Chun Wang Street,
Tseung Kwan O Industrial Estate,
New Territories, Hong Kong.

APPENDIX I
Complaint Log

APPENDIX I – COMPLAINT LOG

Reporting Month: May 2016

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
N.A.	N.A.	N.A.	N.A.	N.A.	N.A.

Remarks: No environmental complaint was received.

APPENDIX J
Investigation Report of Environmental Quality Limit Exceedances (May 2016)

MANNINGS
(Asia) Consultants Limited
Address: 5/F, Winning Commercial Building, 46-48 Hillwood Road, Tsim Sha Tsui, Kowloon
Tel: 852 - 3168 2028 Fax: 852 - 3168 2022

To:	Cinotech	*Date:*	12 July 2016
Attn:	Mr. H. T. Lai	*Fax:*	3107 1388
From:	Mr. Mark Cheung	*Ref:*	D1067/L04468
Job No.	D1067	*Total Pages:*	1

Subject: **Development of a Biodiesel Plant at Tseung Kwan O Industrial Estate Investigation Report for the exceedance event in May 2016**

Dear Sir,

We refer to your submission of the Investigation Report for the exceedance event in May 2016 via email dated 12 July 2016.

We write to advise that we have no comment on the captioned report.

Regards,

Mark Cheung
Independent Environmental Checker

KTC/gk

Development of a Biodiesel Plant at Tseung Kwan O Industrial Estate
- Investigation Report of Environmental Quality Limit Exceedances

Monitoring Month: May 2016

Part A – Exceedance Summary Table

Station	Parameter	Action Level (g/s)	Limit Level (g/s)	Monitoring Result **	Justification	Validity (Yes/No)
Stack of Biogas Flare (EP1)	Carbon monoxide (CO)	N.A. *	0.005 g/s	***0.014 g/s***	(1)	Yes
	Non-methane Organic Compounds (NMOC)		4.9×10^{-4} g/s	***5.1×10^{-4} g/s***	(1)	Yes

* No Action Level was set in the Final EM&A Manual of the Project

** ***Bold Italic*** means Action Level exceedance; ***Bold Italic with underline*** means Limit Level exceedance

*** Justification: (1) After investigation, both exceedances of CO and NMOC were due to incomplete combustion.

Part B – Conclusion: The exceedances were due to the Project, and therefore measures recommended in **Part C** shall be implemented.

Part C – Recommendation: As the exceedance was caused by the Project, recommended follow-up investigations are as follow:

(a) Identify for any unacceptable practice;
(b) Investigate whether the current practice need to be amended or not; and
(c) Review the fuel/air ratio of the Biogas Flare.

No unacceptable practice was identified during the follow-up investigation. Nevertheless, since the original practice for monitoring work (i.e. remove one of the side louvres for inserting a thermocouple to measure the temperature of the exhaust gas) will affect proper mixing of the burner and lower the temperature as recorded with data logger (see **Figure 1**), item (i) was proposed. In addition, items (ii) & (iii) were proposed such that the air/fuel ratio required will never be exceeded.

(i) Install a tube in the flare shroud for inserting the thermocouple, so as to avoid the need to open the louvres during monitoring work (as investigation pointed out that opening the louvres during monitoring work would lower the temperature, and hence affect the combustion of the biogas flare).

(ii) To increase the fresh air intake, the end cover plate will be replaced by an air inlet side louver (see **Figure 2**)
(iii) To limit the biogas flow from the storage buffer to the flare, an orifice will be installed at the biogas supply line, and a pipe section of the biogas supply line will be replaced with a smaller diameter pipe (see **Figure 3**);

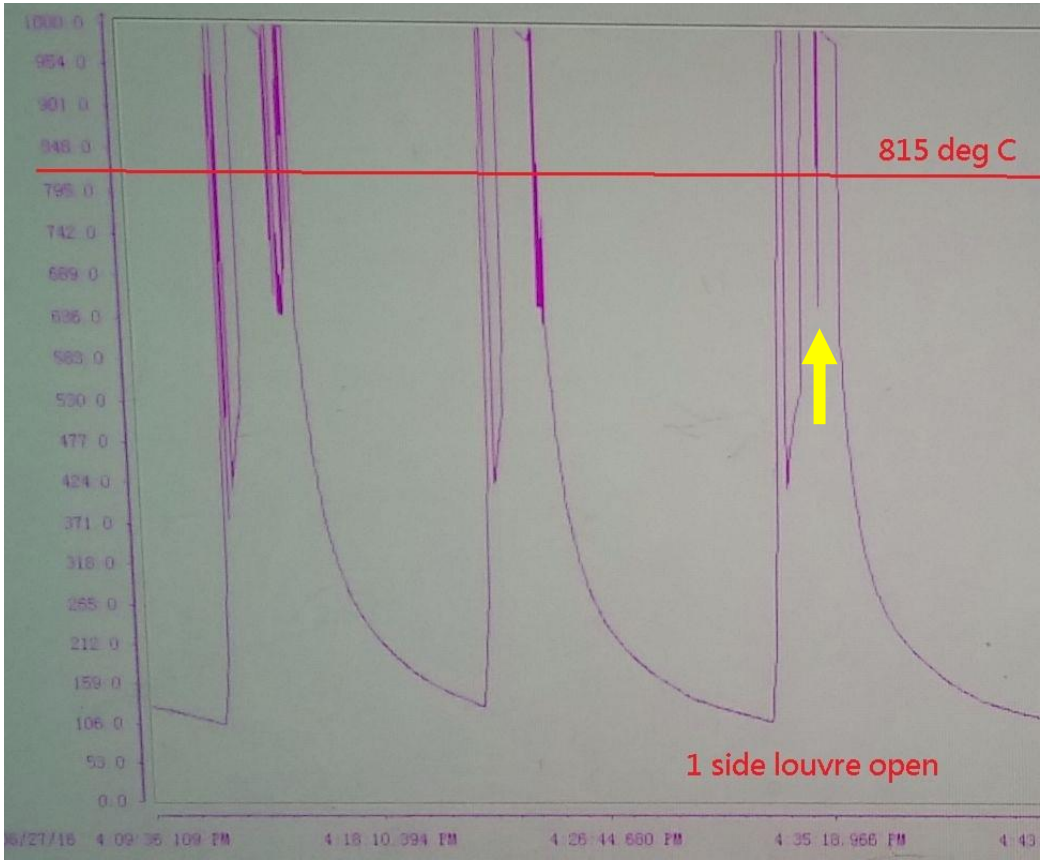


Figure 1: **Temperature Change against Time in the Biogas Flare Stack (peaks on the left and in the middle – combustions with no louvre opened; peak on the right – combustion with 1 side louvre opened)**
If there is a significant temperature drop in the middle of combustion (refers to where the yellow arrow is pointing), this indicates that the flare is not stable enough for good combustion. However, it is normal for the temperature to have fluctuation (i.e. a non-stable flare) at the beginning and near the end of each combustion.

Figure 2: Recommended Changes (in yellow) on the Air-Intake Point of the Biogas Flare Stack

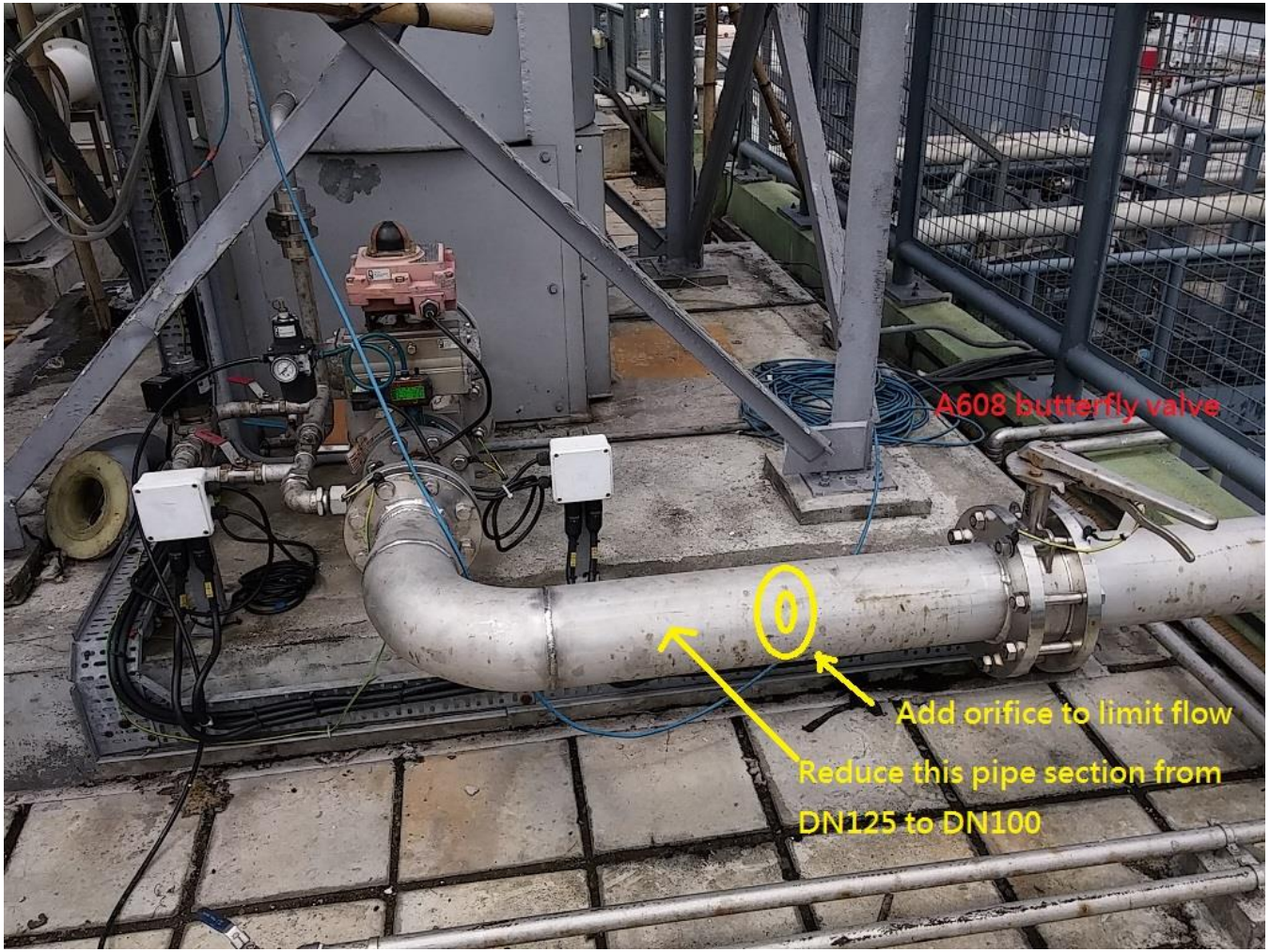


Figure 3: Recommended Changes (in yellow) on the Biogas Supply Line