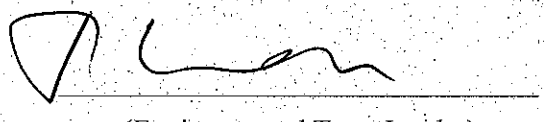
ASB Biodiesel (Hong Kong) Limited

Development of a Biodiesel Plant at Tseung Kwan O Industrial Estate

Monthly EM&A Report

September 2017

(Version 2.0)

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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Attn:	Mr. H. T. Lai	*Fax:*	3107 1388
From:	Mr. Mark Cheung	*Ref:*	D1067/P02722
Job No.	D1067	*Total Pages:*	1

Subject: **Development of a Biodiesel Plant at Tseung Kwan O Industrial Estate**
Draft monthly EM&A report (September 2017) v2.0

Dear Sir,

We refer to your submission of the Draft monthly EM&A report (September 2017) v2.0 via email dated 9 April 2018.

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

Regards,

Mark Cheung
Independent Environmental Checker

KTC/gk

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EXECUTIVE SUMMARY

Introduction

1. This is the 18th 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 September 2017.

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;
   - Specified Process Licence, L-25-019(1), granted on 10 October 2013 &
   - 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, Specified Process Licence 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 (September 2017) is listed in **Table I**.

Table I Summary of Key Information in September 2017

Event	Event Details		Action Taken	Status	Remark
	Number	Nature			
Exceedance of Action & Limit Levels	2	(1) NMOC in emission from Stack of Biogas Flare; & (2) Methanol in emission from Stack of Process Building	Events were investigated and recommendation was 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	2	(1) Monthly EM&A Report (Jul 2017) v2.0; & (2) Monthly EM&A Report (Aug 2017) v1.0	1.) & 2.) Submitted to EPD on 13 September 2017	Verified by IEC	---
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 18th Monthly EM&A report summarizing the EM&A works in operational phase for the Project in September 2017.

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
		Mr. Nelson Tam	Engineer	3183 4315
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
Specified Process (SP) Licence				
L-25-019(1)	10/10/2013	10/10/2015	• Emission of non-fugitive fixed point emissions	Under renewal
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 (EP2)	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)	2.213 kg/h
		Carbon monoxide (CO)	0.553 kg/h
		Sulphur dioxide (SO_2)	0.797 kg/h
		Non-methane Organic Compounds (NMOC)	0.041 kg/h
		Exhaust gas velocity	7 m/s (minimum)
Biogas Flare (EP1)		NO_X	0.053 kg/h
		CO	0.018 kg/h
		SO_2	0.039 kg/h
		NMOC	0.0018 kg/h
		Exhaust gas velocity	0.54 m/s (minimum)
Process Building (EP3)		Acetyldehyde	0.0975 kg/h
		Methanol	0.0975 kg/h
		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 and in the Specified Process Licence

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 (EP5)	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 and in the Specified Process Licence

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**. In addition to parameters listed in **Table 4-1**, exhaust gas velocity was measured. 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

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**. In addition to parameters listed in **Table 4-2**, exhaust gas velocity was measured. 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

Odour Concentrations at the Final Air Scrubber

4.3 Gas in the final air scrubber was sampled and analyzed. Method adopted for analysis is listed in **Table 4-3**. In addition to parameter listed in **Table 4-3**, exhaust gas velocity was measured. Detailed methodology for odour monitoring in the final air scrubber is presented in **Appendix D**.

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

Parameter	Methodology
Odour concentration	European Standard Method (EN13725)

Odour Patrols along Site Boundary

4.4 Odour patrols were carried out by a qualified odour panelist in both morning and afternoon on 13 September 2017. 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 ºC)	APHA 5210B
Chemical Oxygen Demand (COD)	Hach Method 8000
Oil & Grease	APHA 5520B
Sulphate	Hach Method 10248
Total Nitrogen	Hach Method 10071
Total Phosphorus	Hach Method 8190

Water Quality of Stormwater Discharge

4.6 Water quality of stormwater discharge 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 4-5**. In addition to the parameters listed in **Table 4-5**, pH was measured.

Table 4-5 Methodologies for Water Quality Monitoring of Stormwater discharge

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

Sulphur Content in Bio Heating Oil

4.7 In September 2017, BHO in the tank was sampled once. Its sulphur content was then analyzed in accordance with EN-ISO-20486:2011: Determination of sulfur content of automotive fuels – Ultraviolet fluorescence method.

5 MONITORING RESULTS

Air Quality

Emission from Stack 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)	2.213 kg/h	0.62 kg/h
Carbon monoxide (CO)	0.553 kg/h	<0.2 kg/h
Sulphur dioxide (SO_2)	0.797 kg/h	<0.04 kg/h
Non-methane Organic Compounds (NMOC)	0.041 kg/h	0.0035 kg/h
Exhaust gas velocity	7 m/s (minimum)	14.59 m/s
* Average result of all trials is presented		

Emission from Stack 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 One exceedance of Limit Level was reported. The exceedance is found due to unstable flame temperature during sampling. Details of the investigation are 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)	0.053 kg/h	<0.004 kg/h
Carbon monoxide (CO)	0.018 kg/h	<0.015 kg/h
Sulphur dioxide (SO_2)	0.039 kg/h	<0.003 kg/h
Non-methane Organic Compounds (NMOC)	0.0018 kg/h	0.0062 kg/h **
Exhaust gas velocity	0.54 m/s (minimum)	0.675 m/s
* Average result of all trials is presented ** Exceedance of Limit Level		

Emission from Stack of Process Building

5.4 The monitoring results of the emission from the stack of process building are presented in **Table 5-3**. Detailed monitoring result of the emission from the stack of process building is presented in **Appendix C**.

5.5 One exceedance of Limit Level was reported. The exceedance is found due to packing failure in the high pressure methanol recovery column K111200 (i.e. equipment failure). Details of the investigation are presented in **Appendix J**.

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

Parameter	Limit Level	Monitoring Result*
Acetyldehyde	0.0975 kg/h	<0.001 kg/h
Methanol	0.0975 kg/h	0.95 kg/h **
Exhaust gas velocity	0.79 m/s (minimum)	4.1 m/s
* Average result of all trials is presented ** Exceedance of Limit Level		

Odour Concentrations at the Final Air Scrubber

5.6 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	15.35 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

5.7 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; or One documented complaint received	Odour intensity ≥Class 3 recorded on 2 consecutive patrols	1 (Oil and grease)
	2			1~2 (Oil and grease)
	3			0~1 (Oil and grease)
	4			0
	5			0
Afternoon	1			0~1 (Oil and grease)
	2			1~2 (Oil and grease)
	3			0
	4			0
	5			0

Water Quality

Water Quality of Treated Effluent Discharged from Project Site

5.8 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	6.87
Suspended Solids	800 mg/L	140 mg/L
Biochemical Oxygen Demand (BOD) (5 days, 20 ^{o}C)	800 mg/L	620 mg/L
Chemical Oxygen Demand (COD)	2000 mg/L	1023 mg/L
Oil & Grease	50 mg/L	45 mg/L
Sulphate	1000 mg/L	<20 mg/L
Total Nitrogen	200 mg/L	100 mg/L
Total Phosphorus	50 mg/L	17.5 mg/L

Water Quality of Stormwater Discharge

5.9 The water quality monitoring result of stormwater discharge is presented in **Table 5-7**. No exceedance of Limit Level was reported. Detailed water quality monitoring result of treated effluent discharged from Project Site is presented in **Appendix G**.

Table 5-7 Water Quality Monitoring Result of Stormwater Discharge

Parameter	Limit Level	Monitoring Result
pH	Within the range of 6 - 9	7.08
Suspended Solids	50 mg/L	30 mg/L
Biochemical Oxygen Demand (BOD) (5 days, 20 °C)	50 mg/L	<10 mg/L
Chemical Oxygen Demand (COD)	100 mg/L	30 mg/L
Oil & Grease	30 mg/L	<10 mg/L

Sulphur Content in Bio Heating Oil

5.10 The monitoring result of sulphur content in Bio Heating Oil (BHO) is presented in **Table 5-8**. No exceedance of Limit Level was reported. Detailed monitoring result of sulphur content in Bio Heating Oil is presented in **Appendix H**.

Table 5-8 Monitoring Result of Sulphur Content in Bio Heating Oil

Sampling Date	Limit Level	Monitoring Result
6 September 2017	346 ppm	320 ppm

6 SUMMARY OF COMPLAINT AND PROSECUTION

6.1 No environmental related complaint, prosecution or notification of summon was received in September 2017.

6.2 There were 6 environmental complaint, 1 notification of summons, and 1 successful prosecutions received since the commencement of Project (operational phase). The Complaint Log is attached in **Appendix I**.

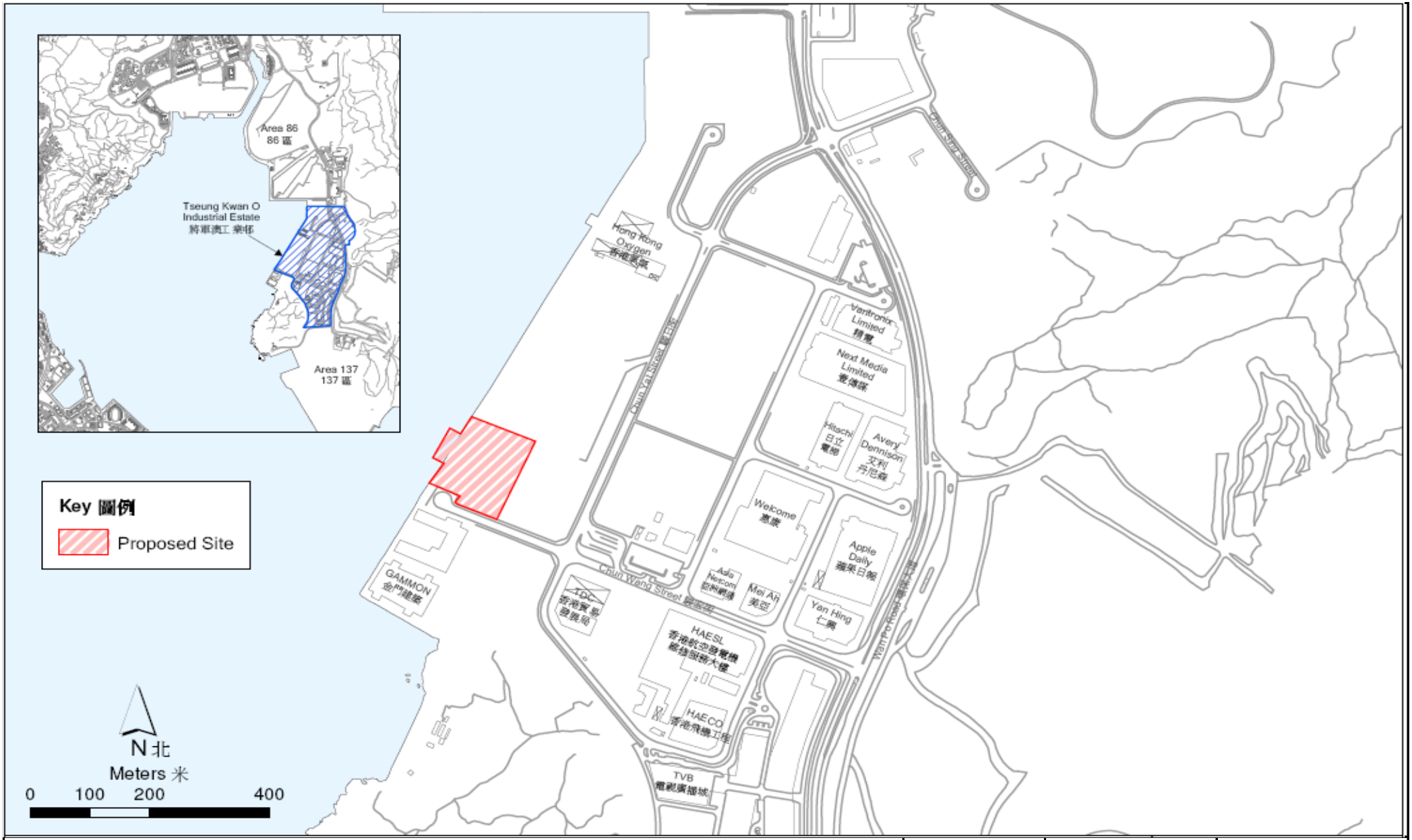
7 CONCLUSIONS

7.1 In September 2017, 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, Specified Process Licence L-25-019(1) 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 Limit Level exceedances at the stack of biogas flare and at stack of process building were recorded. Investigation for the events were carried out, and recommendations were proposed.

7.3 No environmental related complaint, prosecution or notification of summon was received in the reporting month.

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

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STACK GAS SAMPLING AND LABORATORY TESTING REPORT

Location: ASB Biodiesel (Hong Kong) Ltd

Sampling Period: 14th September, 2017

ALS Work Order No: HK1766894

Report Issue Date: 10th October, 2017

CLIENT:
ASB Biodiesel (Hong Kong) Ltd

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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: 14th September, 2017
Location of Stack: Tseung Kwan O Industrial Estate
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 H_2O_2 solution) via regulated gas sampler. Sample will be delivered to ALS Hong Kong Laboratory and analysed by the ion chromatography method.

2.3 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 Non-Methane Organic Compounds (NMOC) 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)	14th September,2017 12:48 - 13:48	14th September,2017 16:58 - 17:58
Nitrogen Oxides (NOx)	14th September,2017 13:55 - 14:55	14th September,2017 15:57 - 16:57
Respirable Suspended Particulates (PM_{10}) and Total Particulates (PM_{total})	14th September,2017 09:34 - 11:05	14th September,2017 11:13 - 12:43
Carbon Monoxide (CO) & Non-Methane Organic Compounds (NMOC)	14th September,2017 14:55 - 15:25	14th September,2017 15:26 - 15:56

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	0.055	201	15.4	11089	10.4
	2	0.054	203	15.5	11357	13.5
NO_x	1	0.023	202	15.8	13238	10.4
	2	0.022	189	13.2	9357	13.5
PM_{10} & PM_{total}	1	0.857	201	14.9	12533	10.4
	2	0.844	201	15.0	12425	13.5
CO	1	0.0083	200	15.4	13276	10.4
	2	0.0083	190	13.0	10105	13.5
NMOC	1	0.006	200	15.4	13276	10.4
	2	0.006	190	13.0	10105	13.5

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	26	28
	mg/m^3	5	53	58
	kg/hr[4] [5]	0.05	0.70	0.54
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	3.0	<3.0	<3.0
	kg/hr[4] [5]	0.040	<0.040	<0.040
Non-Methane Organic Carbon (NMOC)[3]	ppmv	0.2	0.6	0.6
	mg/m^3	0.1	0.3	0.3
	kg/hr[4] [5]	0.001	0.004	0.003
Respirable Suspended Particulates (PM_{10})	mg/m^3	5.0	5.6	<5.0
	kg/hr[4] [5]	0.06	0.07	<0.06
Total Particulates (PM_{total})	mg/m^3	5.0	5.7	<5.0
	kg/hr[4] [5]	0.06	0.07	<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: 27th September, 2017

ALS Work Order No: HK1767492

Report Issue Date: 17th October, 2017

CLIENT:
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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: 27th September, 2017
Location of Stack: Tseung Kwan O Industrial Estate
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 Non-Methane Organic Compounds (NMOC) 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)	27th September,2017 10:25 - 11:25	27th September,2017 16:20 - 17:20
Nitrogen Oxides (NO_x)	27th September,2017 12:19 - 13:19	27th September,2017 15:18 - 16:18
Carbon Monoxide (CO)	27th September,2017 13:20 - 13:50	27th September,2017 14:19 - 14:49
Non-Methane Organic Compounds (NMOC)	27th September,2017 13:20 - 13:50	27th September,2017 14:19 - 14:49

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	0.0538	199	0.8	1225
	2	0.0551	122	0.4	706
Nitrogen Oxides (NO_x)	1	0.0234	126	0.4	678
	2	0.0238	124	0.4	704
Carbon Monoxide (CO)	1	0.0081	200	0.8	1153
	2	0.0082	202	0.9	1244
Non-Methane Organic Compounds (NMOC)	1	0.006	200	0.8	1153
	2	0.006	202	0.9	1244

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	3	<3	<3
	kg/hr	0.003	<0.003	<0.003
Nitrogen Oxides (NO_x) [2]	ppmv	3	<3	<3
	mg/m^3	5	<5	<5
	kg/hr	0.004	<0.004	<0.004
Carbon Monoxide (CO)	ppmv	10	<10	<10
	mg/m^3	13	<13	<13
	kg/hr	0.015	<0.015	<0.015
Non-Methane Organic Compounds (NMOC) [3]	ppmv	0.2	11.7	7.8
	mg/m^3	0.1	6.3	4.2
	kg/hr	0.0001	0.0072	0.0052

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: 14th September, 2017

ALS Work Order No: HK1766895

Report Issue Date: 10th October, 2017

CLIENT:
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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: 14th September, 2017
Location of Stack: Tseung Kwan O Industrial Estate
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	14th September, 2017 09:50 - 10:50	14th September, 2017 10:53 - 11:53
Methanol	14th September, 2017 09:50 - 10:50	14th September, 2017 10:53 - 11:53

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	0.0577	56.2	4.2	220
	2	0.0579	59.1	4.0	208
Methanol	1	0.006	56.2	4.2	220
	2	0.006	59.1	4.0	208

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	3407	2795
	mg/m^3	70	4867	3992
	kg/hr	0.01	1.07	0.83

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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For ASB Biodiesel (Hong Kong) Limited

Odour Measurement at ASB Biodiesel Plant

29 September 2017

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 29 September 2017.

. 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 29 September 2017 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	29 September 2017	11:15	A	0.0962	0.75	194	14.0
2	Final air scrubber	29 September 2017	11:20	A	0.0962	0.75	232	16.7

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

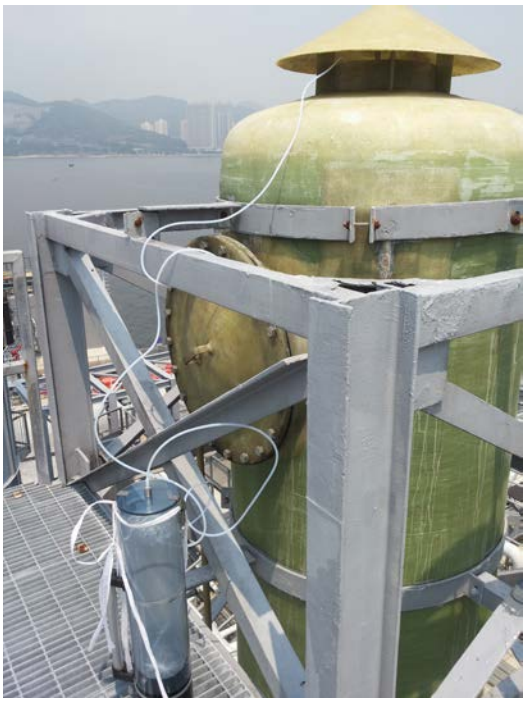
A total of two odour samples were tranported to the Odour Research Centre of THEi. The olfactometry analysis was conducted within 24 hours after the sampling work using a dynamic olfactometer in accordance with the European Standard Method (EN13725). Four qualified panellists participated in the odour 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 rate are summarized in Table 1.

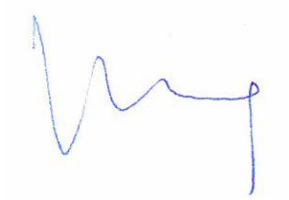
The photos about the on-site sampling activity at the final air scrubber are presented below,



Final air scrubber

Final air scrubber

Prepared by:

KH NG Signed: 

Odour Research Centre at THEi

APPENDIX E
Air Quality Monitoring Report – Odour Patrol

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For ASB Biodiesel (Hong Kong) Limited

Odour Patrol at ASB Biodiesel Plant

13 September 2017

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 13 September 2017.

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 easily 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 13 September 2017.

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 The illustrations about odour patrol activities at different locations are presented below:

1

2

3

4

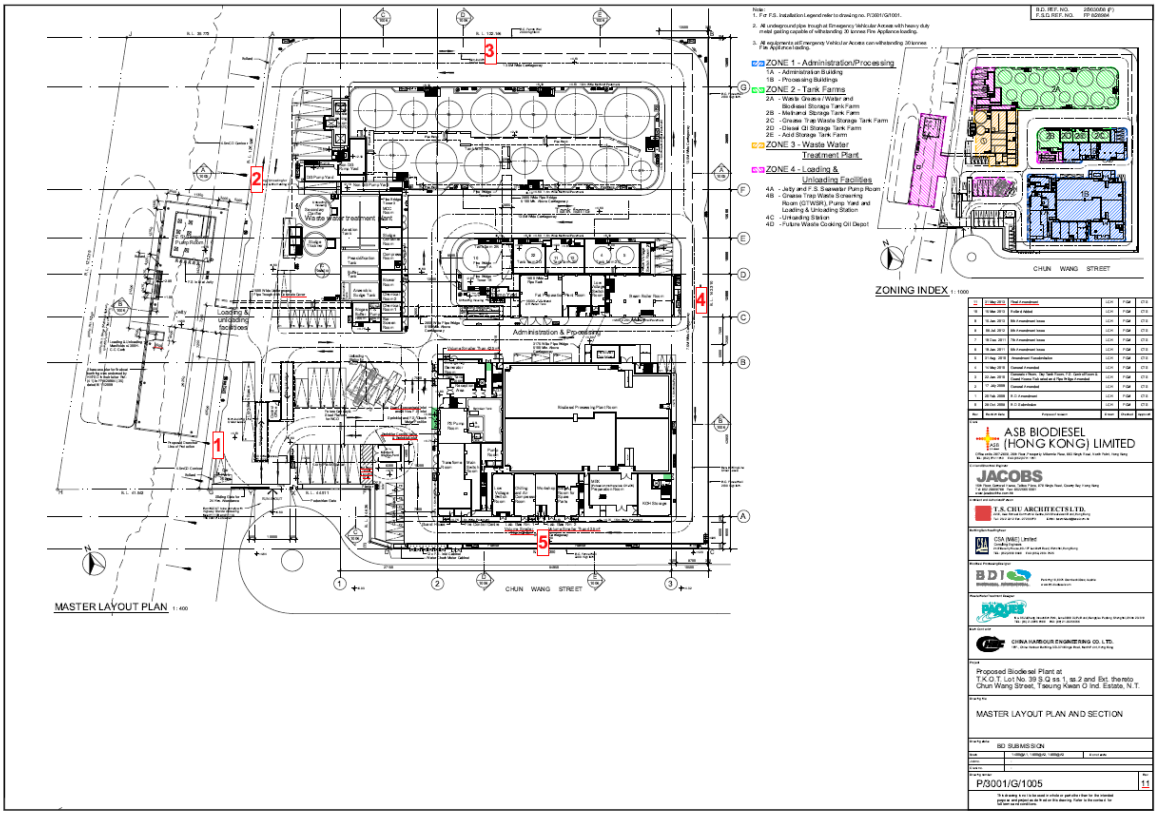
5

4.6 All odour patrol data and findings in two trips on 13 September 2017 are summarized in Table 1 as shown below:

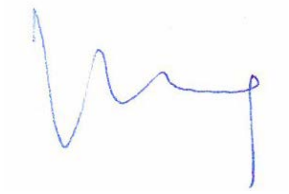
Table 1: Summary of odour patrol survey data and findings

Date	Location	Time	Weather	Wind		Odour	Observations
				Speed (m/s)	Direction	Intensity	Odour Nature
13 September 2017	1	10:05	Fine	1.6	NE	1	Oil and Grease
	2	10:09		2.2	NE	1~2	Oil and Grease
	3	10:14		1.9	NE	0~1	Oil and Grease
	4	10:18		2.4	NE	0	
	5	10:22		0.7	NE	0	
	1	12:17	Fine	0.8	NE	0~1	Oil and Grease
	2	12:21		2.0	NE	1~2	Oil and Grease
	3	12:26		2.3	NE	0	
	4	12:30		1.5	NE	0	
	5	12:33		1.2	NE	0	

Figure 1: Five 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. : S301-20170904-0900
Date : 8 September, 2017
Page : 1 of 1

TEST REPORT

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

SAMPLE RECEIVED DATE : 4 September, 2017

TESTING DATE : 4 - 8 September, 2017

TEST RESULT :

TEST	METHOD	UNIT	LIMIT	RESULT
pH	/	/	6-10	6.87
TCOD	HACH Method 8000	mg/L	2000	1023
Sulfate	HACH Method 10248	mg/L	1000	<20
Total Nitrogen (as N)	HACH Method 10071	mg/L	200	100
Total Phosphorous (as P)	HACH Method 8190	mg/L	50	17.5
Total Suspended Solid	APHA 2540 D	mg/L	800	140
Oil & Grease	APHA 5520 B	mg/L	50	45
BOD_5	APHA 5210 B	mg/L	800	620

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

ASB BIODIESEL (HONG KONG) LIMITED

Authorized Signature

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

APPENDIX G
Water Quality Monitoring Result – Stormwater Discharge

ASB Biodiesel (Hong Kong) Ltd.

No. : SP2-20170901-0900
Date : 4 September, 2017
Page : 1 of 1

TEST REPORT

SAMPLE DESCRIPTION : SP2, Water Pollution Control Ordinance (CAP. 358)
Licence No.: WT00022972-2015

SAMPLE RECEIVED DATE : 1 September, 2017

TESTING DATE : 1-4 September, 2017

TEST RESULT :

TEST	METHOD	UNIT	LIMIT	RESULT
pH	/	/	6-9	7.08
TCOD	HACH Method 8000	mg/L	100	30
Total Suspended Solid	APHA 2540 D	mg/L	50	30
Oil & Grease	APHA 5520 B	mg/L	30	<10
BOD_5	APHA 5210 B	mg/L	50	<10

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

ASB BIODIESEL (HONG KONG) LIMITED

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.	:	T21-20170906-0900
Date	:	6 September, 2017
Page	:	1 of 1

TEST REPORT

SAMPLE DESCRIPTION : Bio Heating Oil, Tank 21

SAMPLE RECEIVED DATE : 6 September, 2017

TESTING DATE : 6 September, 2017

TEST RESULT :

TEST	METHOD	UNIT	RESULT
Sulphur	EN ISO 20846: 2011	mg/kg	320

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

ASB BIODIESEL (HONG KONG) LIMITED

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: September 2017

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
COM-2016-09-001	Not Specified	24th September, 2016	2 Gammon engineers complained about strong odour and oily discharge at 9:15 am	The incident was due to the pump P101A was tripped and leaded to an overflow of wastewater at Influent Pit T101. According to the project proponent, at 8:45 am, high level alarm at Level Indicator of T101 was triggered and the water level in Influent Pit T101 was over 100%. Investigation found out that wastewater was flooding from Bar Screen Room to road because the pump P101A was not operating in the field (although the pump was indicated operating in Process Control System). Operator then immediately stopped the wastewater feeding to Influent Pit T101, and put sand bags around the stormwater grating outside the pedestrian walkway of Bar Screen Room to block wastewater leaking into storm water drainage. Afterwards, operator cleaned up the area. The problem was resolved at 10:30 am at the same day, and no irritation smell was sensed outside the project site. To prevent recurrence, the following measures are recommended: - Cover the storm water grating outside the bar screen room pedestrian walkway by steel plate; - Modify the pump P101A temporary control circuit to feedback overload trip signal back to Process Control System. Maintenance will set up periodic inspection programme to monitor pump performance; and - Review the emergency handling procedures.	Closed
COM-2016-10-002	Not Specified	5th October, 2016	EPD referred that a councilor complained about constant smell released from the Project	Investigation found out that housekeeping of the plant was unsatisfactory and improvements are required. Operator has improved housekeeping, including: - Always keep the gate of the grease trap waste screening room closed; - Always keep sludge containers closed; - Frequent cleaning of drainage system; and - Always keep the work site clean and tidy	Closed

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
COM-2016-10-003	Not Specified	18th October, 2016	EPD referred that a complaint on malodour from the Project was received on 11th October 2016	Investigation found no process upset during that week. Operator has put the best effort housekeeping (e.g. keeping sludge containers and rooms closed and frequent cleaning of drainage system), and staff have been trained on housekeeping.	Closed
COM-2017-02-004	Not Specified	6th February, 2017	EPD referred complaints from Drainage Service Department (DSD) and neighboring sites regarding the blockage of public sewerage system along Chun Wang Street. DSD reported to EPD that some oily substances and debris had blocked the sewerage system.	Investigation found similar substances (i.e. oily substances and debris) at the foul manhole within the Plant. Investigation also found that untreated effluent was discharged to a foul manhole within the Plant. Follow-up action (i.e. cleaning of internal sewerage system, from FMH01 to TFMH01) was carried out in early February. In addition, operator has put the best effort (e.g. carry out staff training) to ensure that all effluent are treated properly by wastewater treatment facilities before discharge.	Closed
COM-2017-07-005	Not Specified	4th July, 2017	EPD referred that resident of LOHAS Park complained operation of ASB plant caused noise nuisance (low frequency machinery noise continuously round the clock) and emitted unpleasant malodour on 19 June, 2017.	<u>Noise Nuisance</u> Since there are other noise sources which operate continuously round the clock (e.g. cooling tower from other buildings) between the Project Site and LOHAS Park, the noise nuisance could be due to other noise sources. In addition, investigation found no process upset on that day. Considering the long distance (at least 900m) between the Project Site and LOHAS Park, the noise nuisance may not be caused by the operator. <u>Unpleasant Malodour</u> Investigation found no process upset during the week. Since the regular odour monitoring (i.e. odour measurement at the Final Air Scrubber and odour patrol along Site boundary) did not report any exceedance event (except this complaint) in June and July 2017, the unpleasant malodour may not be caused by the Project considering the long distance (at least 900m) between the Project Site and LOHAS Park. Operator has, and will, put the best effort housekeeping (e.g. keeping sludge containers and rooms closed and frequent cleaning of drainage system) to minimize odour nuisance.	Closed

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
COM-2017-07-006	Stack of Boiler	4th July, 2017	EPD referred that a complaint on continuous dark smoke emission from Stack of Boiler on 30 June, 2017 at about 6 pm.	Investigation found that a Pressure Control Valve had malfunctioned, causing unsteady oil flow into burner. This led to a low air to fuel ratio which ultimately led to dark smoke emission. The Valve was repaired on 1st July 2017 morning, and no dark smoke was emitted.	Closed

APPENDIX J
Investigation Report of Environmental Quality Limit Exceedances (September 2017)

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 April 2018
Attn:	Mr. H. T. Lai	*Fax:*	3107 1388
From:	Mr. Mark Cheung	*Ref:*	D1067/P02723
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 September 2017**

Dear Sir,

We refer to your submission of the Investigation Report for the exceedance event in September 2017 via email dated 9 April 2018.

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

Please keep tracking on the conditions of the equipment in order to avoid the recurrence of exceedance event. For any investigation required in the future, please carry out the investigation and compile the report as soon as practicable.

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: September 2017

Exceedance Summary Table

Station	Parameter	Action Level	Limit Level	Monitoring Result **	Justification	Validity (Yes/No)
Stack of Biogas Flare (EP1)	Non-methane Organic Compounds (NMOC)	N.A. *	0.0018 kg/hr	***0.0062 kg/hr***	(1)	Yes
Stack of Process Building (EP3)	Methanol	N.A. *	0.0975 kg/hr	***0.95 kg/hr***	(2)	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) Investigation pointed out that the exceedance of NMOC was due to unstable flame temperature during sampling. The unstable flame temperature could result in some NMOC (especially with long carbon chain) not being burnt (i.e. not being removed).

(2) Investigation found out that there was packing failure in the high pressure methanol recovery column K111200 (i.e. equipment failure). This leads to the exceedance in methanol.

Part B – Conclusion: The exceedance was 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; and

(b) Investigate whether the current practice need to be amended or not.

Regarding the exceedance of NMOC in emission from Stack of Biogas Flare, investigation pointed out that the unstable flame temperature was due to unstable biogas flow. This was caused by 1) un-stable and insufficient biogas generation from the wastewater treatment plant, and 2) biogas stored in the buffer tank is not sufficient to maintain a stable biogas flow for burning throughout the sampling period (from 10:25 to 17:20). Nevertheless, in order to provide sufficient gas for sampling, the Biogas Flare was still operated even when the biogas flow was unstable (which will not happen during

normal operation). This resulted that the flare was not operated in designed condition, and hence led to the exceedance event. In addition, as the Biogas Flare will not be operated with unstable biogas flow, the sampling is considered not representative. Therefore, it is recommended to suspend and postpone the sampling, if the biogas is not sufficient for the Biogas Flare to be operated as in normal condition.

Regarding the exceedance of methanol in emission from Stack of Process Building, it was due to equipment failure. Immediate action (i.e. to minimize the methanol loading on the impaired column K111200 as much as possible) was carried out after the failure identified. Although the maintenance work was finished in December 2017, no exceedance of methanol was reported in subsequent monitoring (i.e. November 2017, as no monitoring at Stack of Process Building was carried out in October 2017 due to limited production). This confirmed the effectiveness of the immediate action. In addition, as subsequent monitoring after the maintenance work in December 2017 (i.e. January 2018) reported no exceedance of methanol at the Stack, this confirmed the problem was rectified.

Monitoring results of methanol in November 2017 & January 2018

	Limit Level*	Monitoring Results	
		Nov 2017	Jan 2018
Methanol at Stack of Process Building (EP3)	0.0975 kg/hr	< 0.01 kg/hr	0.02 kg/hr
* No Action Level was set in the Final EM&A Manual of the Project			