

ASB Biodiesel (Hong Kong) Limited

**Development of a Biodiesel Plant at
Tseung Kwan O Industrial Estate**

Monthly EM&A Report

Aug 2018

(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.

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<i>Job No.</i>	D1067	<i>Total Pages:</i>	1

**Subject: Development of a Biodiesel Plant at Tseung Kwan O Industrial Estate
Draft monthly EM&A report (Aug 2018)**

Dear Sir,

We refer to your submission of the Draft monthly EM&A report (Aug 2018 – v2.0) via email dated 11 Decemeber 2018.

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

Regards,

Mark Cheung
Independent Environmental Checker

KTC/SC/ly



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EXECUTIVE SUMMARY

Introduction

1. This is the 28th 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 August 2018.

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(2), granted on 19 July 2018 &
 - Water Pollution Control Ordinance Licence, WT00029932-2017, granted on 22 December 2017.

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.
4. Since the operation of the wastewater treatment plant was very limited during August 2018, the amount of biogas produced was not sufficient for the sampling of the emission from stack of biogas flare. Monitoring on emission from the stack was suspended in August 2018, and will be resumed in September 2018.

Key Information in the Reporting Month

5. Summary of key information in this reporting month (August 2018) is listed in **Table I**.

Table I Summary of Key Information in August 2018

Event	Event Details		Action Taken	Status	Remark
	Number	Nature			
Exceedance of Action & Limit Levels *	0	---	N/A	N/A	---
Complaint received	0	---	N/A	N/A	No on-going complaints
Changes to the assumptions and key construction / operation activities recorded	0	---	N/A	N/A	---
Status of submissions under EP	1	Monthly EM&A Report (July 2018) v1.0	Submitted to EPD on 14 Aug 2018	Verified by IEC	---
Notifications of any summons & prosecutions	0	---	N/A	N/A	---
* Monitoring results of emission from stacks of boiler and process building are not included, as the testing reports are not ready upon the submission of this monthly EM&A report.					

1 INTRODUCTION

Background

- 1.1 ASB Biodiesel Plant (hereafter referred to as “the Plant”) was established in 2013 for the production of biodiesel and crude glycerine using cooking oil (UCO) and grease trap waste (GTW). The plant is located at Tseung Kwan O Industrial Estate (see **Figure 1.1** for the location plan of Project Site) and are able to produce 100,000 tonnes of low-carbon fuel per year for selling to both local and overseas market. The plant uses multi-feedstock which consists of UCO, oil and grease recovered from GTW, palm fatty acid distillate (PFAD) and animal fats. The 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 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 29th Monthly EM&A report summarizing the EM&A works in operational phase for the Project in August 2018.

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. Andy Chan	EHS & Licensing Manager	3183 4202
		Mr. Nelson Tam	Engineer	3183 4315
Mannings	Independent Environmental Checker	Mr. Mark Cheung	Independent Environmental Checker	3168 2028
		Ms. Peggy Pan	Assistant to Independent Environmental Checker	3970 8690
Cinotech	Environmental Team	Dr. HF Chan	ET Leader	2151 2088
		Ms. Karina Chan	Project Coordinator	2157 3880

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;
- Monitoring requirements as listed in the Specified Process (SP) Licence granted; &
- Monitoring requirements as listed in the Water Pollution Control Ordinance (WPCO) Licence granted

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 <ul style="list-style-type: none"> • a biochemical plant with a storage capacity of more than 500 tonnes and in which substances are processed and produced; • a storage, transfer and transshipment 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(2)	19/07/2018	18/07/2020	<ul style="list-style-type: none"> • Emission of non-fugitive fixed point emissions 	Valid
L-25-019(1)	10/10/2013	10/10/2015	<ul style="list-style-type: none"> • Emission of non-fugitive fixed point emissions 	Expired on 10/10/2015
Water Pollution Control Ordinance (WPCO) Licence				
WT00029932-2017	22/12/2017	31/12/2019	Discharge of <ul style="list-style-type: none"> • effluent from wastewater treatment facilities to communal foul sewer; and • effluent from floor washing of operation areas to communal storm drain 	Valid
WT00022972-2015	16/12/2015	31/12/2017	Discharge of <ul style="list-style-type: none"> • effluent from wastewater treatment facilities to communal foul sewer; and • effluent from floor washing of operation areas to communal storm drain 	Expired on 31/12/2017

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)	Once per month.	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
		Respirable suspended particulates	0.111 kg/h
		Odour	2,400 OU/s
		Exhaust gas velocity	10.00 m/s (minimum)
Biogas Flare (EP1)	Once per month.	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)	Once per month.	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)	Once per month.*	Odour Exhaust gas velocity	– **	28.6 OU/s 0.70 m/s (minimum)
Odour Patrols along the Project Site Boundary	Two times a day, one in the morning and one in the afternoon <ul style="list-style-type: none"> • Twice a month for the licence period; and • If the action level is triggered, the frequency will be increased to three times a month until compliance with the action level for three consecutive months is obtained and the frequency will be resumed to twice a month thereafter. 	Odour Intensity	<ul style="list-style-type: none"> • Odour intensity \geq Class 2 recorded; or • One documented complaint received 	<ul style="list-style-type: none"> • Odour intensity \geq 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	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Rectify any unacceptable practice Amend working methods as required Implement amended working methods, if necessary
Exceedance of Action Level for odour	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> Verify the Notification of Exceedance submitted by the ET Leader 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 °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 °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	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • 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 Stack of Boiler

- 4.1 Emission from the stack of boiler was 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.

Table 4-1 Methodologies for Monitoring of Emission from Stack of Boiler

Parameter	Methodology
Nitrogen oxides (NO _x)	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
Respirable suspended particulates	USEPA Method 201A
Odour	European Standard Method (EN13725)

Emission from Stack of Biogas Flare

- 4.2 Since the operation of the wastewater treatment plant was very limited during August 2018, the amount of biogas produced was not sufficient for the sampling of the emission from stack of biogas flare. Therefore, monitoring on emission from the stack was suspended in August 2018, and will be resumed in September 2018.

Emission from Stack of Process Building

- 4.3 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.

Table 4-2 Methodology 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

- 4.4 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

- 4.5 Odour patrols were carried out by a qualified odour panelist in both morning and afternoon on 8th Aug 2018 and 21st August 2018. 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*

- 4.6 Treated effluent discharged from Project Site was sampled and analyzed. Methodologies for water quality monitoring 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 °C)	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

- 4.7 As water quality of stormwater discharge is required to be monitored quarterly, next monitoring will be carried out in September 2018. No monitoring was carried out in August 2018.

Sulphur Content in Bio Heating Oil

- 4.8 In August 2018, BHO in the tank was sampled once. Its sulphur content was then analyzed in accordance with EN-ISO-20486:2011: Determination of sulphur content of automotive fuels – Ultraviolet fluorescence method.

5 MONITORING RESULTS

Air Quality

Emission from Stack of Boiler

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

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

Parameter	Limit Level	Monitoring Result*
Nitrogen oxides (NO _x)	2.213 kg/h	1.575 kg/h
Carbon monoxide (CO)	0.553 kg/h	0.2 kg/h
Sulphur dioxide (SO ₂)	0.797 kg/h	< 0.03 kg/h
Non-methane Organic Compounds (NMOC)	0.041 kg/h	0.001 kg/h
Respirable suspended particulates (PM ₁₀)	0.111 kg/h	0.075 kg/h
Exhaust gas velocity	10 m/s (minimum)	17.08 m/s

* Average result of all trials is presented

- 5.2 Detailed monitoring result of the emission from the stack of boiler is presented in **Appendix A**.
- 5.3 Odour measurement at the boiler stack (EP2) outlet was carried out on 21 August 2018 and no exceedance of the limit level was recorded. The monitoring results for the boiler stack are summarised in **Table 5-2** and detailed monitoring results report is presented in **Appendix A-1**.

Table 5-2 Monitoring Result of the Odour Concentrations at the Boiler Stack (EP2)

Parameter	Limit Level	Monitoring Result*
Odour	2400 OU/s	348.5 OU/s
Exhaust gas velocity	10.0 m/s (minimum)	15 m/s

* Average result of all trials is presented

Emission from Stack of Biogas Flare

- 5.4 Emission from stack of biogas flare was not monitored in August 2018 (see **Section 4.2** for details).

Emission from Stack of Process Building

- 5.5 The monitoring result of the emission from the stack of process building is presented in **Table 5-2**. 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	0.0975 kg/h	0.00003 kg/h
Methanol	0.0975 kg/h	0.0058 kg/h
Exhaust gas velocity	0.79 m/s (minimum)	0.8 m/s
* Average result of all trials is presented		

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	28.6 OU/s	8.38 OU/s
Exhaust gas velocity	0.7 m/s (minimum)	0.83 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 on 8 th Aug 2018 (Odour Nature)	Measured Level on 21 th Aug 2018 (Odour Nature)
Morning	1	Odour intensity \geq Class 2 recorded; or	Odour intensity \geq Class 3 recorded on 2 consecutive patrols	1 (Oil and grease)	1 (Oil and grease)
	2			1 (Oil and grease)	1 (Oil and grease)
	3			0	0
	4			1 (Oil and grease)	1 (Oil and grease)
	5			0	0
Afternoon	1	One documented complaint received		1 (Oil and grease)	0
	2			1 (Oil and grease)	1 (Oil and grease)
	3			0	1 (Oil and grease)
	4			0	0
	5			0	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	7.78
Suspended Solids	800 mg/L	140 mg/L
Biochemical Oxygen Demand (BOD) (5 days, 20 °C)	800 mg/L	50 mg/L
Chemical Oxygen Demand (COD)	2000 mg/L	80 mg/L
Oil & Grease	50 mg/L	46 mg/L
Sulphate	1000 mg/L	180 mg/L
Total Nitrogen	200 mg/L	2.2 mg/L
Total Phosphorus	50 mg/L	15 mg/L

Water Quality of Stormwater Discharge

- 5.9 Water quality of stormwater discharge was not monitored in August 2018 (see **Section 4.7** for details).

Sulphur Content in Bio Heating Oil

- 5.10 The monitoring result of sulphur content in Bio Heating Oil (BHO) 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
20 August 2018	346 ppm	298 ppm

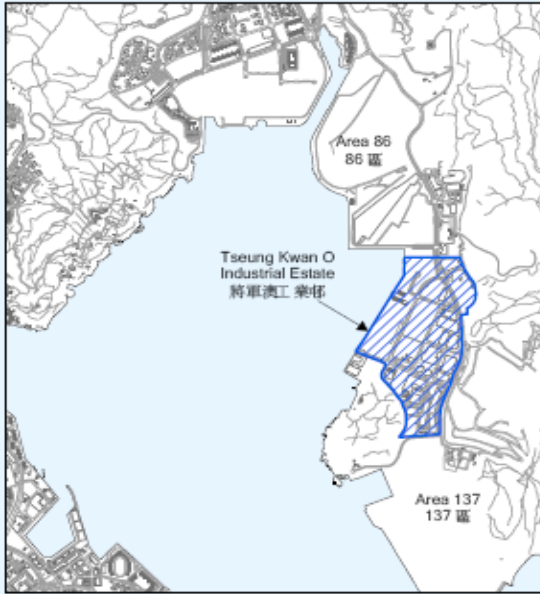
6 SUMMARY OF COMPLAINT AND PROSECUTION

- 6.1 No environmental related complaints were received in August 2018. And all investigations for complaints received in the previous reporting months have been closed.
- 6.2 In total, 16 environmental complaints, 6 notifications of summons, and 5 successful prosecutions were received since the operation of Project. The Complaint Log is attached in **Appendix I**.

7 CONCLUSIONS

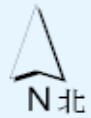
- 7.1 In August 2018, environmental monitoring and audit works were carried out in accordance with criteria and requirements listed in the Project EM&A Manual, Environmental Permit EP-319/2009D, Specified Process Licence L-25-019(2) and Water Pollution Control Ordinance Licence WT00029932-2017.
- 7.2 Monitoring of air quality, water quality and sulphur content in Bio Heating Oil were carried out at designated locations. No exceedance of Action and Limit Levels was recorded.
- 7.3 Since the operation of the wastewater treatment plant was very limited during August 2018, the amount of biogas produced was not sufficient for the sampling of the emission from stack of biogas flare. Monitoring on emission from the stack was suspended in August 2018, and will be resumed in September 2018.
- 7.4 No environmental related complaints were received in August 2018. And all investigations for complaints received in the previous reporting months are closed.

FIGURES



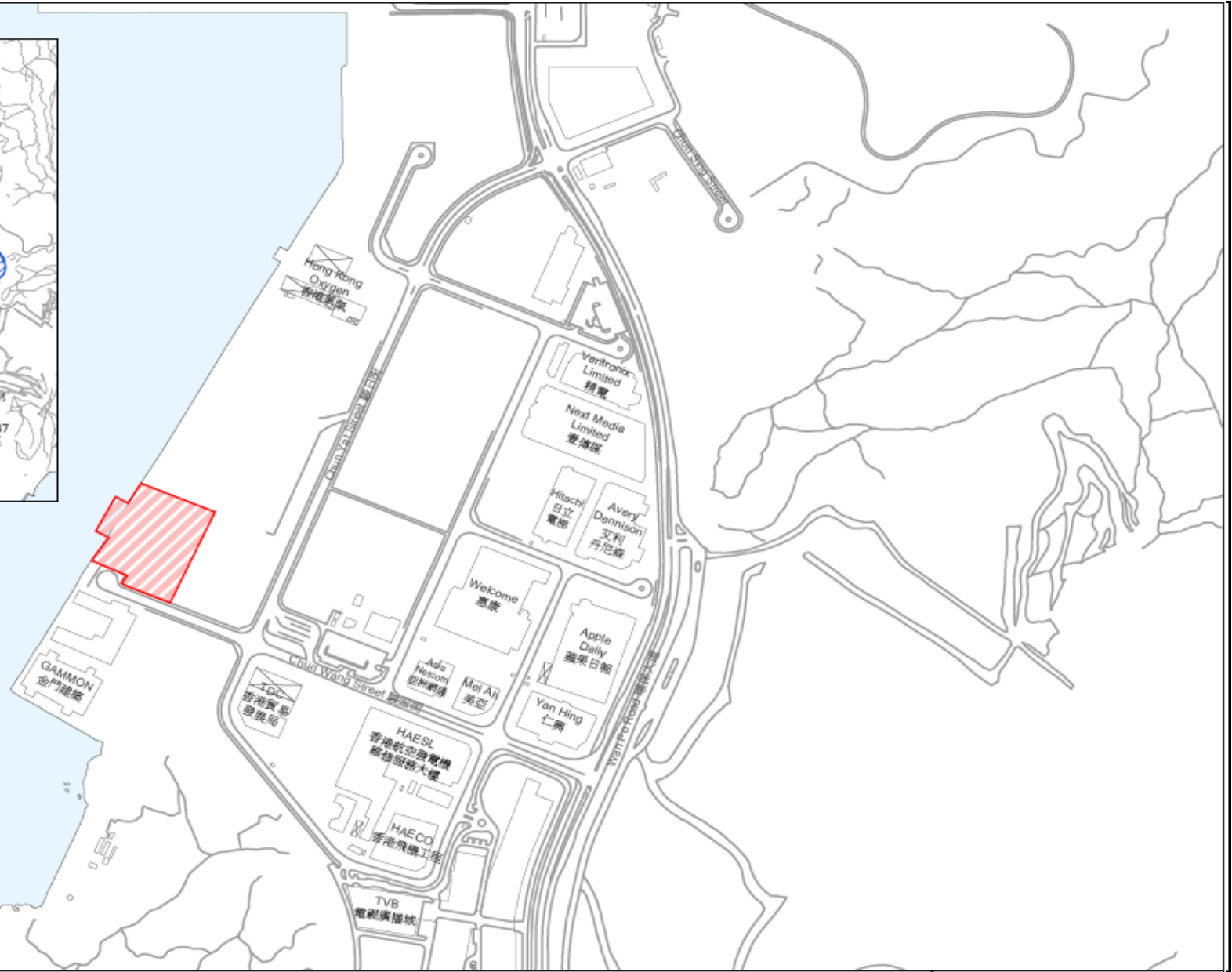
Key 圖例

 Proposed Site



Meters 米

0 100 200 400



Title Development of a Biodiesel Plant at Tseung Kwan O Industrial Estate

Location Plan

Scale

N.T.S

Date

MAY 2016

Project

No.

MA15052

Figure

1.1



APPENDIX A
Air Quality Monitoring Report – Odour
Measurement at Stack Of Boiler



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AW0055036(8) Date : 12 Sep 2018

Application No. : LW025983(5)

Applicant : ASB BIODIESEL (HONG KONG) LTD.
22 CHUN WANG STREET,
TSEUNG KWAN O INDUSTRIAL ESTATE
NEW TERRITORIES, HONG KONG

Project Name : Stack gas measurement on Tseung Kwan O Biodiesel Plant for
ASB Biodiesel (Hong Kong) Ltd.

Sampling Point : Boiler – EP2.

Sampling Date : 21 Aug 2018.

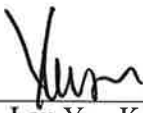
Test Requested : 1. Velocity / Volumetric Flow Rate;
2. Respirable Suspended Particulates (RSP);
3. Sulphur Dioxide (SO₂) ;
2. Carbon monoxide (CO);
3. Nitrogen oxides (NO_x);
4. Non-Methane Organic Compounds (NMOC).

Methodology : Refer to pages 2.

Test Result : Refer to pages 3 to 4.

For and on behalf of
CMA Industrial Development Foundation Limited

Authorized Signature :


Lau Yan Kin
Senior Manager
Environmental Division

Page 1 of 4



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AW0055036(8)

Date : 12 Sep 2018

Application No. : LW025983(5)

Methodology :

Respirable Suspended Particulates – USEPA Method 201A

The stack emission test for measuring RSP emission was carried out by using an Isokinetic Stack Sampling System in accordance with the Reference Method 201A of the United States Environmental Protection Agency [“USEPA”]. Extract a sample of gas at a predetermined constant flow rate through an in-stack sizing device. The particle-sizing device separates particles of RSP. After a sample is obtained, remove uncombined water from the particulate, and then use gravimetric analysis to determine the particulate mass for each size fraction.

Sulphur Dioxide – USEPA Method 6

The stack emission test for measuring SO₂ concentration was carried out by using an Isokinetic Stack Sampling System in accordance with the Reference Method 6 of USEPA. Stack flue gas was extracted into the sampling system and SO₂ in the flue gas was absorbed in 3% hydrogen peroxide solution and then measured by barium-thorin titration method. Concentration of SO₂ in flue gas was then determined from the mass of SO₂ obtained and gas volume extracted similarly to that for PM.

Carbon Monoxide – USEPA Method 10B

CO level was determined using USEPA Reference Method 10B. Stack gas sample was extracted into a Tedlar Bag and analysed by gas chromatography flame ionization detector (GC/FID).

Nitrogen Oxides – USEPA Method 7C

NO_x concentration was determined using USEPA Reference Method 7C. Stack flue gas sample was extracted and then collected in alkaline-potassium permanganate solution. The NO_x in the gas sample would then be oxidized to nitrate and nitrite. The nitrate would in turn be reduced to nitrite with cadmium and the total nitrite was then analyzed colorimetrically, giving the mass of NO_x obtained. The NO_x concentration was then determined from the mass of NO₂.

Non-Methane Organic Compounds – USEPA Method TO12

This was made by sampling the stack flue gas with Tedlar Bag and then analyzed by Gas Chromatography. The amount of organic substance was expressed as carbon.



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AW0055036(8)

Date : 12 Sep 2018

Application No. : LW025983(5)

Sampling Schedule :

Parameter	Trial	
	1	2
RSP	21 Aug 2018, 9:57 – 10:57	21 Aug 2018, 11:17 – 12:17
SO ₂	21 Aug 2018, 14:31 – 15:31	21 Aug 2018, 15:44 – 16:44
CO	21 Aug 2018, 14:35 – 15:35	21 Aug 2018, 15:44 – 16:44
NO _x	21 Aug 2018, 12:30 – 13:30	21 Aug 2018, 13:35 – 14:35
NMOC	21 Aug 2018, 9:57 – 10:57	21 Aug 2018, 11:17 – 12:17



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AW0055036(8)

Date : 12 Sep 2018

Application No. : LW025983(5)

Results :

Parameter	Unit	Trial	
		1	2
Average Stack Gas Velocity (RSP)	m/s	18.1	17.4
Average Stack Gas Velocity (SO ₂)		16.2	16.6
Average Stack Gas Temperature (RSP)	°C	205	203
Average Stack Gas Temperature (SO ₂)		200	204
RSP	mg/dscm	<5	<5
	kg/hr	<0.075	<0.075
SO ₂	mg/dscm	<2	<2
	kg/hr	<0.03	<0.03
CO	ppmv	<10	<10
	kg/hr	<0.2	<0.2
NO _x as NO ₂	mg/dscm	118	109
	kg/hr	1.69	1.46
NMOC as Carbon	mg/dscm	<0.1	<0.1
	kg/hr	<0.001	<0.001

Note: 1. dscm means dry standard cubic meter, which is corrected to temperature of 273 K and a pressure of 101.3 kilopascals (1atm).

2. "<" denotes less than.

***** End of Report *****

For ASB Biodiesel (Hong Kong) Limited

Odour Measurement at ASB Biodiesel Plant

21 August 2018

Anage Technology Development Limited

1. Background

An odour assessment service was required by ASB Biodiesel (Hong Kong) Limited to collect odour samples at the boiler stack (EP2) 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 boiler stack (EP2) 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 boiler stack (EP2) and deliver the collected samples to laboratory for olfactometry analysis on 21 August 2018.
- . to conduct laboratory olfactometry analysis to determine the odour concentration of the collected odour samples;
- . to calculate the odour emission rate at the boiler stack (EP2);
- . 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 per cubic 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 $1 \text{ OU}_E/\text{m}^3$. The odour concentration is then expressed in terms of multiples of the detection threshold. The range of measurement is typically from $2^2 \text{ OU}_E/\text{m}^3$ to $2^{17} \text{ OU}_E/\text{m}^3$ (excluding pre-dilution).



Olfactometer

3.3 Determination of Odour Emission Rate

The odour emission rate (OER) at the boiler stack (EP2) can be calculated by the following equation:

$$\text{OER (ou/s)} = \text{Odour concentration (ou/m}^3\text{)} \times \text{Cross section area of outlet (m}^2\text{)} \times \text{Outlet gas flow velocity (m/s)}.$$

4. Odour Sampling and Olfactometry Measurement

4.1 Sampling Activities

The odour sampling works was conducted on 21 August 2018 at the boiler stack (EP2). A total of two odour samples were collected on the site and delivered to Anage Technology Development Limited (ANG) immediately.

During the odour sampling, the wind speed was measured on the outlet of boiler stack (EP2). 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	Boiler stack (EP2)	21 August 2018	15:05	A	0.44	15.0	54.3	358
2	Boiler stack (EP2)	21 August 2018	15:10	A	0.44	15.0	51.4	339

Remark: A: Ambient sampling; a: Cross section area of boiler stack (EP2); V: Gas flow velocity from boiler stack (EP2); OC: Odour concentration; OER: Odour emission rate from boiler stack (EP2).

4.2 Olfactometry Measurement and Analytical Results

A total of two odour samples were transported to Anage Technology Development Limited (ANG). 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. The certificates for the qualified odour panel members are provided in Appendix A.

According to the odour concentration determined for each sample, the odour emission rates at the boiler stack (EP2) were calculated as follows:

$OER (ou/s) = \text{Odour concentration (ou/m}^3) \times \text{Cross section area of outlet (m}^2) \times \text{Outlet gas flow velocity (m/s)}$.

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 boiler stack (EP2) are presented below,



Boiler stack (EP2)

Certificate for a Qualified Odour Panel Member



27 June 2018

Re: A Certificate for a Qualified Odour Panel Member

This is to certify that Mr. Harry Ho participated in a set of n-butanol screening tests in Anage Technology Development Limited between 22 June 2018 and 27 June 2018. His odour threshold of n-butanol in nitrogen gas was found to be in the range of 20 – 80 ppb/v and a standard deviation of $R < 2.3$. According to the requirement of the European Standard Method of Air Quality – Determination of Odour Concentration by Dynamic Olfactometry (EN13725), he is qualified to participate olfactometry analysis to determine odour concentration.

Yours sincerely



Anage Technology Development Limited

Certificate for a Qualified Odour Panel Member



27 June 2018

Re: A Certificate for a Qualified Odour Panel Member

This is to certify that Miss. Ashley Zhu participated in a set of n-butanol screening tests in Anage Technology Development Limited between 22 June 2018 and 27 June 2018. Her odour threshold of n-butanol in nitrogen gas was found to be in the range of 20 – 80 ppb/v and a standard deviation of $R < 2.3$. According to the requirement of the European Standard Method of Air Quality – Determination of Odour Concentration by Dynamic Olfactometry (EN13725), she is qualified to participate olfactometry analysis to determine odour concentration.

Yours sincerely



Anage Technology Development Limited

Certificate for a Qualified Odour Panel Member



27 June 2018

Re: A Certificate for a Qualified Odour Panel Member

This is to certify that Miss. Helen Ysui participated in a set of n-butanol screening tests in Anage Technology Development Limited between 22 June 2018 and 27 June 2018. Her odour threshold of n-butanol in nitrogen gas was found to be in the range of 20 – 80 ppb/v and a standard deviation of $R < 2.3$. According to the requirement of the European Standard Method of Air Quality – Determination of Odour Concentration by Dynamic Olfactometry (EN13725), she is qualified to participate olfactometry analysis to determine odour concentration.

Yours sincerely



Anage Technology Development Limited

Certificate for a Qualified Odour Panel Member



27 June 2018

Re: A Certificate for a Qualified Odour Panel Member

This is to certify that Mr. Rex Li participated in a set of n-butanol screening tests in Anage Technology Development Limited between 22 June 2018 and 27 June 2018. His odour threshold of n-butanol in nitrogen gas was found to be in the range of 20 – 80 ppb/v and a standard deviation of $R < 2.3$. According to the requirement of the European Standard Method of Air Quality – Determination of Odour Concentration by Dynamic Olfactometry (EN13725), he is qualified to participate olfactometry analysis to determine odour concentration.

Yours sincerely



Anage Technology Development Limited

Prepared by:



Anage Technology Development Limited

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



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AW0055037(9) Date : 06 Sep 2018

Application No. : LW025983(5)

Applicant : ASB BIODIESEL (HONG KONG) LTD.
22 CHUN WANG STREET,
TSEUNG KWAN O INDUSTRIAL ESTATE
NEW TERRITORIES, HONG KONG

Project Name : Stack gas measurement on Tseung Kwan O Biodiesel Plant for
ASB Biodiesel (Hong Kong) Ltd.

Sampling Point : Process Building – EP3.

Sampling Date : 21 Aug 2018.

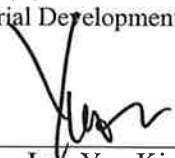
Test Requested : 1. Velocity / Volumetric Flow Rate;
2. Acetaldehyde;
3. Methanol.

Methodology : Refer to pages 2.

Test Result : Refer to pages 3 to 4.

For and on behalf of
CMA Industrial Development Foundation Limited

Authorized Signature : _____


Lau Yan Kin
Senior Manager
Environmental Division

Page 1 of 4



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AW0055037(9)

Date : 06 Sep 2018

Application No. : LW025983(5)

Methodology :

Acetaldehyde – USEPA Method TO-11A

The emission test was carried out in accordance with the reference TO-11A of the United States Environmental Protection Agency [“USEPA”]. Flue gas was extracted into the sampling system and analyte in the flue gas was absorbed DNPH-coated silica gel absorption tube. Concentration in flue gas was then delivered to laboratory and analysed by liquid chromatography with ultraviolet detector (HPLC-UV).

Methanol – USEPA Method TO-14

The emission test was carried out in accordance with the reference TO-14 of the United States Environmental Protection Agency [“USEPA”]. This was made by sampling the stack flue gas with Tedlar Bag and then analyzed by gas chromatography flame ionization detector (GC/FID).



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AW0055037(9)

Date : 06 Sep 2018

Application No. : LW025983(5)

Sampling Schedule :

Parameter	Trial	
	1	2
Acetaldehyde and Methanol	21 Aug 2018, 10:45 - 11:45	21 Aug 2018, 12:00 - 13:00



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AW0055037(9)

Date : 06 Sep 2018

Application No. : LW025983(5)

Results :

Parameter	Unit	Trial	
		1	2
Average Stack Gas Velocity	m/s	0.8	0.8
Average Stack Gas Temperature	°C	38.5	38.2
Acetaldehyde	mg/m ³	0.54	0.70
	kg/hr	0.00002	0.00003
Methanol	mg/m ³	131	75
	kg/hr	0.0058	0.0033

Note: 1. mg/m³ means milligram per cubic meter, which is corrected to temperature of 273 K and a pressure of 101.3 kilopascals (1atm).
2. "<" denotes less than.

***** End of Report *****

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

For ASB Biodiesel (Hong Kong) Limited

Odour Measurement at ASB Biodiesel Plant

21 August 2018

Anage Technology Development Limited

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 21 August 2018.
- . 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 per cubic 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 $1 \text{ OU}_E/\text{m}^3$. The odour concentration is then expressed in terms of multiples of the detection threshold. The range of measurement is typically from $2^2 \text{ OU}_E/\text{m}^3$ to $2^{17} \text{ OU}_E/\text{m}^3$ (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:

$$\text{OER (ou/s)} = \text{Odour concentration (ou/m}^3\text{)} \times \text{Cross section area of outlet (m}^2\text{)} \times \text{Outlet gas flow velocity (m/s)}.$$

4. Odour Sampling and Olfactometry Measurement

4.1 Sampling Activities

The odour sampling works was conducted on 21 August 2018 at the final air scrubber. A total of two odour samples were collected on the site and delivered to Anage Technology Development

Limited (ANG) 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	21 August 2018	14:35	A	0.0962	0.83	102	8.14
2	Final air scrubber	21 August 2018	14:40	A	0.0962	0.83	108	8.62

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 transported to Anage Technology Development Limited (ANG). 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. The certificates for the qualified odour panel members are provided in Appendix A.

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

$$\text{OER (ou/s)} = \text{Odour concentration (ou/m}^3\text{)} \times \text{Cross section area of outlet (m}^2\text{)} \times \text{Outlet gas flow velocity (m/s)}.$$

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

Appendix A: Certificates for the qualified odour panel members

Certificate for a Qualified Odour Panel Member



27 June 2018

Re: A Certificate for a Qualified Odour Panel Member

This is to certify that Mr. Harry Ho participated in a set of n-butanol screening tests in Anage Technology Development Limited between 22 June 2018 and 27 June 2018. His odour threshold of n-butanol in nitrogen gas was found to be in the range of 20 – 80 ppb/v and a standard deviation of $R < 2.3$. According to the requirement of the European Standard Method of Air Quality – Determination of Odour Concentration by Dynamic Olfactometry (EN13725), he is qualified to participate olfactometry analysis to determine odour concentration.

Yours sincerely



Anage Technology Development Limited

Certificate for a Qualified Odour Panel Member



27 June 2018

Re: A Certificate for a Qualified Odour Panel Member

This is to certify that Miss. Ashley Zhu participated in a set of n-butanol screening tests in Anage Technology Development Limited between 22 June 2018 and 27 June 2018. Her odour threshold of n-butanol in nitrogen gas was found to be in the range of 20 – 80 ppb/v and a standard deviation of $R < 2.3$. According to the requirement of the European Standard Method of Air Quality – Determination of Odour Concentration by Dynamic Olfactometry (EN13725), she is qualified to participate olfactometry analysis to determine odour concentration.

Yours sincerely



Anage Technology Development Limited

Certificate for a Qualified Odour Panel Member



27 June 2018

Re: A Certificate for a Qualified Odour Panel Member

This is to certify that Miss. Helen Ysui participated in a set of n-butanol screening tests in Anage Technology Development Limited between 22 June 2018 and 27 June 2018. Her odour threshold of n-butanol in nitrogen gas was found to be in the range of 20 – 80 ppb/v and a standard deviation of $R < 2.3$. According to the requirement of the European Standard Method of Air Quality – Determination of Odour Concentration by Dynamic Olfactometry (EN13725), she is qualified to participate olfactometry analysis to determine odour concentration.

Yours sincerely



Anage Technology Development Limited

Certificate for a Qualified Odour Panel Member



27 June 2018

Re: A Certificate for a Qualified Odour Panel Member

This is to certify that Mr. Rex Li participated in a set of n-butanol screening tests in Anage Technology Development Limited between 22 June 2018 and 27 June 2018. His odour threshold of n-butanol in nitrogen gas was found to be in the range of 20 – 80 ppb/v and a standard deviation of $R < 2.3$. According to the requirement of the European Standard Method of Air Quality – Determination of Odour Concentration by Dynamic Olfactometry (EN13725), he is qualified to participate olfactometry analysis to determine odour concentration.

Yours sincerely



Anage Technology Development Limited

Prepared by:



Anage Technology Development Limited

APPENDIX E
Air Quality Monitoring Report – Odour
Patrol

For ASB Biodiesel (Hong Kong) Limited

Odour Patrol at ASB Biodiesel Plant

21 August 2018

Anage Technology Development Limited

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 21 August 2018.

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 Anage Technology Development Limited (ANG) 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 identify 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 weak 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 a qualified odour panelist from ANG 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 (see his certificate in Appendix A) from ANG 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 21 August 2018.
- 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 identified the odour nature at each location.
- 4.5 The illustrations about odour patrol activities at different locations are presented below:



1



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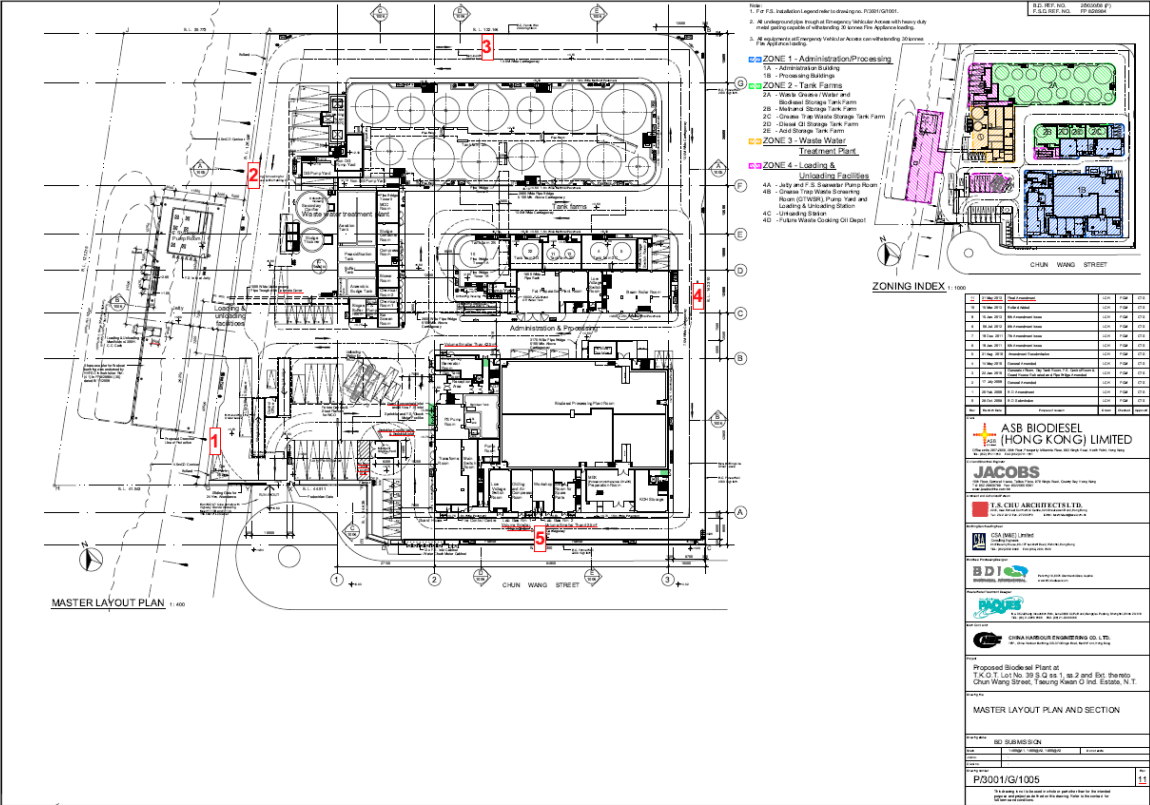
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4.6 All odour patrol data and findings in two trips on 21 August 2018 are summarized in Table 1 as shown below:

Table 1: Summary of odour patrol survey data and findings

Date	Location	Time	Weather	Wind		Odour Intensity	Observations
				Speed (m/s)	Direction		Odour Nature
21 August 2018	1	11:15	Cloudy	1.5	NE	1	Oil and Grease
	2	11:19		1.8	NE	1	Oil and Grease
	3	11:24		3.1	NE	0	
	4	11:28		1.4	NE	1	Oil and Grease
	5	11:32		1.7	NE	0	
	1	14:02	Cloudy	0.5	S	0	
	2	14:06		0.2	S	1	Oil and Grease
	3	14:11		2.6	S	1	Oil and Grease
	4	14:15		2.9	S	0	
	5	14:18		2.0	S	0	

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



Certificate for a Qualified Odour Panel Member



30 July 2018

Re: A Certificate for a Qualified Odour Panel Member

This is to certify that Mr. James Ng participated in a set of n-butanol screening tests in Anage Technology Development Limited between 25 July 2018 and 30 July 2018. His odour threshold of n-butanol in nitrogen gas was found to be in the range of 20 – 80 ppb/v and a standard deviation of $R < 2.3$, which comply with the requirement of the European Standard Method of Air Quality – Determination of Odour Concentration by Dynamic Olfactometry (EN13725). The valid period is three months from the date of this certificate.

Yours sincerely



Anage Technology Development Limited

Prepared by:



Anage Technology Development Limited

For ASB Biodiesel (Hong Kong) Limited

Odour Patrol at ASB Biodiesel Plant

8 August 2018

Anage Technology Development Limited

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 8 August 2018.

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 Anage Technology Development Limited (ANG) 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 identify 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 weak 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 a qualified odour panelist from ANG 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 (see his certificate in Appendix A) from ANG 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 8 August 2018.
- 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 identified the odour nature at each location.
- 4.5 The illustrations about odour patrol activities at different locations are presented below:



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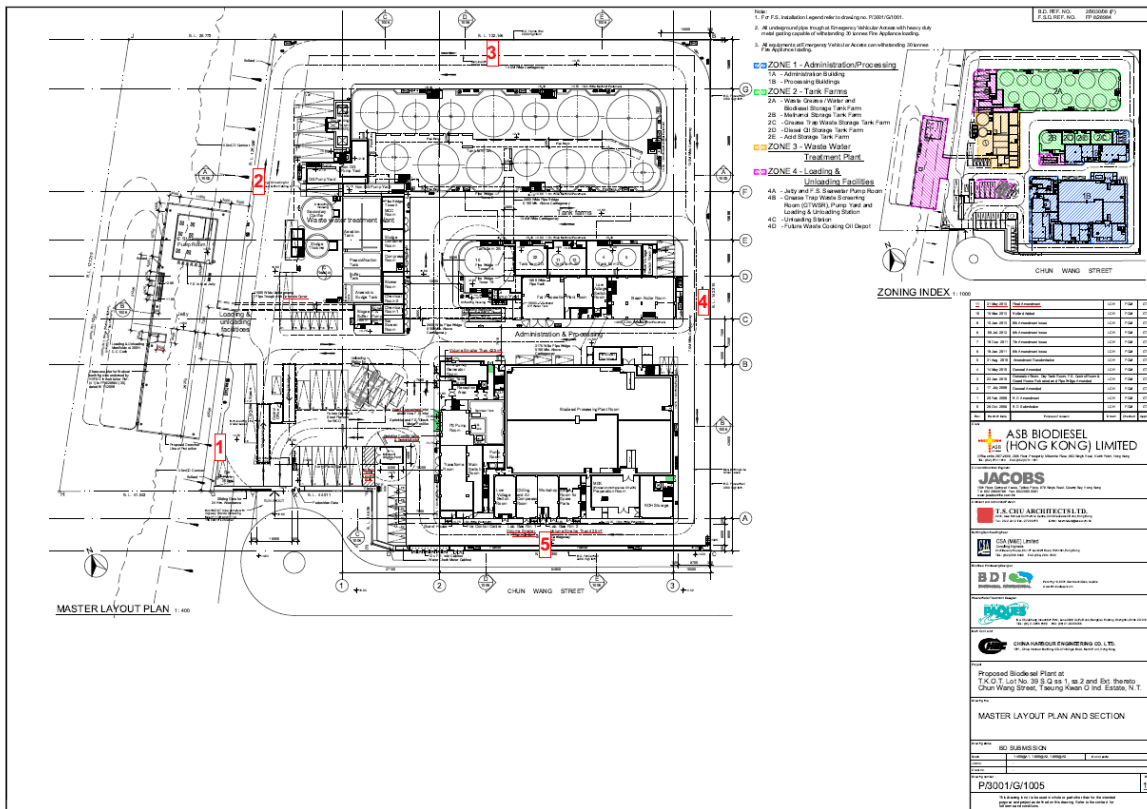
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4.6 All odour patrol data and findings in two trips on 8 August 2018 are summarized in Table 1 as shown below:

Table 1: Summary of odour patrol survey data and findings

Date	Location	Time	Weather	Wind		Odour Intensity	Observations
				Speed (m/s)	Direction		Odour Nature
8 August 2018	1	9:48	Fine	2.3	NE	1	Oil and Grease
	2	9:52		2.0	NE	1	Oil and Grease
	3	9:57		3.4	NE	0	
	4	10:01		1.8	NE	1	Oil and Grease
	5	10:04		1.6	NE	0	
	1	12:13	Fine	3.6	NE	1	Oil and Grease
	2	12:17		2.9	NE	1	Oil and Grease
	3	12:22		2.4	NE	0	
	4	12:26		2.7	NE	0	
5	12:30		1.2	NE	0		

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



Certificate for a Qualified Odour Panel Member



30 July 2018

Re: A Certificate for a Qualified Odour Panel Member

This is to certify that Mr. Ken Wong participated in a set of n-butanol screening tests in Anage Technology Development Limited between 25 July 2018 and 30 July 2018. His odour threshold of n-butanol in nitrogen gas was found to be in the range of 20 – 80 ppb/v and a standard deviation of $R < 2.3$, which comply with the requirement of the European Standard Method of Air Quality – Determination of Odour Concentration by Dynamic Olfactometry (EN13725). The valid period is three months from the date of this certificate.

Yours sincerely



Anage Technology Development Limited

Prepared by:



Anage Technology Development Limited

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

TEST REPORT

SAMPLE DESCRIPTION : Stream 1, Water Pollution Control Ordinance (CAP. 358)
Licence No.: WT00029932-2017

SAMPLE RECEIVED DATE : 27 august, 2018

TESTING DATE : 27-31 August, 2018

TEST RESULT :

TEST	METHOD	UNIT	LIMIT	RESULT
pH	/	/	6-10	7.78
TCOD	HACH Method 8000	mg/L	2000	80
Sulfate	HACH Method 10248	mg/L	1000	180
Total Nitrogen (as N)	HACH Method 10071	mg/L	200	2.2
Total Phosphorous (as P)	HACH Method 8190	mg/L	50	15.0
Total Suspended Solid	APHA 2540 D	mg/L	800	140
Oil & Grease	APHA 5520 B	mg/L	50	46
BOD ₅	APHA 5210 B	mg/L	800	50

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




JAY LEUNG
LABORATORY MANAGER

APPENDIX H
Test Result – Sulphur Content in Bio
Heating Oil



TEST REPORT

SAMPLE DESCRIPTION : Bio Heating Oil, Tank 21
SAMPLE RECEIVED DATE : 20 August, 2018
TESTING DATE : 20 August, 2018
TEST RESULT :

TEST	METHOD	UNIT	RESULT
Sulphur	EN ISO 20846: 2011	mg/kg	298

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




JAY LEUNG
LABORATORY MANAGER

APPENDIX I
Complaint Log

APPENDIX I – COMPLAINT LOG**Reporting Month:** Aug 2018

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
COM-2016-09-001	Not Specified	24 th September, 2016	2 Gammon engineers complained about strong odour and oily discharge at 9:15 am	<p>The incident was due to the pump P101A was tripped and led to an overflow of wastewater at Influent Pit T101.</p> <p>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).</p> <p>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, the 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.</p> <p>To prevent recurrence, the following measures are recommended:</p> <ul style="list-style-type: none"> - 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	5 th October, 2016	EPD referred that a councilor complained about constant smell released from the Project	<p>Investigation found out that housekeeping of the plant was unsatisfactory and improvements are required.</p> <p>Operator has improved housekeeping, including:</p> <ul style="list-style-type: none"> - 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	18 th October, 2016	EPD referred that a complaint on malodour from the Project was received on 11 th 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	6 th 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, the 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	4 th 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.	<p><u>Noise Nuisance</u></p> <p>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.</p> <p><u>Unpleasant Malodour</u></p> <p>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.</p>	Closed

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
COM-2017-07-006	Stack of Boiler	4 th 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 1 st July 2017 morning, and no dark smoke was emitted.	Closed
COM-2017-10-007	Not Specified	6 th October 2017	EPD referred that employee of nearby plant (Chun Wang Street, Tseung Kwan O Industrial Estate) complained ASB biodiesel plant emitting malodour continuously.	Investigation found no process upset during the week. 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 complaint) in this reporting month. Nevertheless, as joint site visit on 1 st November 2017 carried out by ET & IEC identified several environmental deficiencies. Necessary actions were proposed to the Operator, and the Operator rectified the deficiencies.	Closed
COM-2017-10-008	Not Specified	17 th October 2017	EPD referred that employee of nearby plant (Chun Wang Street, Tseung Kwan O Industrial Estate) complained ASB biodiesel plant emitting malodour from 7:15am to afternoon on 12 Oct 2017 and from 7:50am to afternoon on 13 Oct 2017.	Investigation found no process upset during the week. 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 complaint) in this reporting month. Nevertheless, as joint site visit on 1 st November 2017 carried out by ET & IEC identified several environmental deficiencies. Necessary actions were proposed to the Operator, and the Operator rectified the deficiencies.	Closed
COM-2017-11-009	Stack of Boiler	17 th November 2017	EPD referred that a complaint was received regarding continuous dark smoke emission from Stack of Boiler on 14 Nov 2017 at 12:50pm.	Investigation found that the steam boiler was tripped (the P11 filter was blocked) and caused dark smoke emission. The Operator had stopped the production immediately, and carried out maintenance work (filter cleaning and purging) to rectify the problem. The Operator will carry out regular maintenance more frequently to minimize the chance of tripping. The Operator also carried out an incident sharing on 18 Dec 2018 to prevent recurrence of similar event.	Closed

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
COM-2017-11-010	Stack of Boiler	20 th November 2017	EPD referred that a complaint was received regarding continuous dark smoke emission from Stack of Boiler on 18 Nov 2017 from 11:00am to noon (12:00).	Investigation found that the steam boiler was tripped (the P11 filter was blocked) and caused dark smoke emission. The Operator had stopped the production immediately, and carried out maintenance work to rectify the problem. As the same filter was cleaned on 14 Nov 2017 (COM-2017-11-009) and was blocked again within a few days, the Operator replaced the filter. The Operator will carry out regular maintenance more frequently to minimize the chance of tripping. The Operator also carried out an incident sharing on 18 Dec 2018 to prevent recurrence of similar event.	Closed
COM-2017-11-011	Not Specified	21 st November 2017	EPD referred that employee of nearby plant complained ASB biodiesel plant emitting malodour continuously.	Although investigation found no process upset during the week, the roller door of the sludge container room was impaired, which would emit malodour. The Operator fixed the roller door. Nevertheless, 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 complaint) in this reporting month. Besides, joint site visit on 11 th December 2017 carried out by ET & IEC identified several environmental deficiencies. Necessary actions were proposed to the Operator, and the Operator rectified the deficiencies.	Closed
COM-2017-11-012	Not Specified	23 th November 2017	EPD referred that a complainant complained ASB biodiesel plant emitting malodour across Chun Wang Street.	Investigation found no process upset during the week. The impaired roller door of the sludge container room (COM-2017-11-011) hadn't been fixed. The Operator fixed the roller door. Nevertheless, 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 complaint) in this reporting month. Besides, joint site visit on 11 th December 2017 carried out by ET & IEC identified several environmental deficiencies. Necessary actions were proposed to the Operator, and the Operator rectified the deficiencies.	Closed

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
COM-2017-11-013	Not Specified	29 th November 2017	EPD referred that a complainant at Tseung Kwan O Industrial Estate complained ASB biodiesel plant emitting malodour continuously, from Monday to Saturday, from 8:00am to 7:00pm. The complainant suspected that the odourous gas is toxic and causes air pollution. The complainant also pointed out that complaint on malodour was raised one year ago. Although the malodour was mitigated after EPD's follow-up action, the problem resumed after 2 weeks.	<p>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 complaint) since the commencement of the Project's operational phase.</p> <p>Nevertheless, during the year, site visits carried out by EPD and site audits carried out jointly by the Operator, ET and IEC identified environmental deficiencies which would pose malodour problem. The recent joint site audit carried out by the Operator, ET and IEC on 11th December 2017 identified several environmental deficiencies. Necessary actions were proposed to the Operator, and the Operator rectified the deficiencies.</p> <p>Regarding the complainant suspected that the odourous gas is toxic, investigation found no chemical leakage record. In addition, according to the monthly monitoring result, acetaldehyde and methanol emissions from the stack of process building were lower than reporting level in the reporting month. Therefore, the odourous gas is not likely to be due to chemicals.</p> <p>It is expected that the malodour was due to environmental deficiencies (e.g. sludge being left on ground, doors not being closed properly) identified by ET and IEC. It is because the complainant mentioned that the malodour had existed for a long time, and similar environmental deficiencies were identified in past site visits.</p>	Closed
COM-2017-11-014	Not Specified	29 th November 2017	EPD referred that a complaint complained oily substances being discharged from an outfall near the roundabout at the western end of Chun Wang Street. The oily substances was suspected to be discharged from the ASB biodiesel plant.	<p>Investigation found that the diaphragm pump of S811 in the wastewater treatment plant was blocked. To prevent wastewater overflowing, the Operator placed a plastic tray underneath the pump. In addition, the Operator installed inflatable bladder to prevent wastewater flowing out via drainage channel. As the Operator had implemented measures to prevent wastewater being discharged via drainage channel, the event is not likely to be caused by the pump blockage.</p> <p>Nevertheless, a joint site visit on 11th December 2017 carried out by ET & IEC found oily substance being left near drainage channel. The Operator has 1.) cleaned up the oily substance; 2.) cleaned the oil interceptor; and 3.) cleaned the drainage system.</p>	Closed

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
COM-2018-01-015	Not Specified	29 th January 2018	EPD referred that a complainant complained ASB biodiesel plant emitting malodour across Chun Wang Street.	Investigation found that the tricanter in the wastewater treatment plant was blocked on 29 th January 2018. During maintenance on the same day, some odourous material (e.g. sludge) spilled out. The Operator has cleaned up the spilled material. Joint site visit on 5 th February 2018 carried out by ET & IEC identified several environmental deficiencies. Necessary actions were proposed to the Operator, and the Operator rectified the deficiencies.	Closed
COM-2018-04-016	Not Specified	13 th April 2018	EPD referred a complaint regarding continuous dark smoke emission from chimney on 12 Apr 2018 afternoon.	Investigation found that the dark smoke was emitted from the Stack of Boiler, which was under testing after the reparation of the boiler. The Operator also pointed out that the dark smoke emission was due to cold starting of the boiler and is inevitable. As the boiler was cold and was not in optimized temperature, the fuel cannot be combusted completely for a short period of time. Nevertheless, in order to minimize dark smoke emission, the Operator had 1.) pre-heated the fuel and 2.) set the fan to the highest speed to provide enough air for combustion. Although the Operator has camera for real-time monitoring at chimney, it is recommended that the Operator should provide a log on the duration of dark smoke emission. This allows the Operator to ensure that the inevitable dark smoke emission complies environmental license(s) granted.	Closed