

Annex I

Investigation Report

Investigation Report of Odour Sampling Exceedance

Date	31 August 2018
Time	11:04-11:07 am
Monitoring Location	Centralized Air Pollution Control (CAPC) Unit ((Detailed location and photos shown on the marked drawing DR-OAP-20-0-CA-1001 attached as Appendix A)
Weather	Fine
Parameter	Odour
Exceedance Description	<ol style="list-style-type: none"> 1. On 31 August 2018, air samples were collected from the outlet of the Centralised Air Pollution Control (CAPC) unit by ALS for measurement of the Odour Intensity by olfactometry analysis at the laboratory. According to the EM&A Manual and EP requirements, it is considered an exceedance if the odour level is more than 220 OU/Nm³. the odour level of the odour samples collected from the CAPC unit have exceeded the odour limits stated in Table 2.2 of the EM&A Manual. (The detail sampling results are shown in Appendix B.) 2. Odour emitting activities, including wastewater treatment plant and ammonia stripping plant (ASP) were operating on 31 August 2018. 3. No organic waste were being processed the time the odour samples were being collected, due to pre-treatment line was stopped and only operated at mid night. 4. The CAPC system was operating during the odour sampling. 5. The contractor reported that the active carbon (AC) filter and the venturi scrubber in Building 2 were operating. The wet & chemical scrubbers were not operating at the time of the sampling as it is still under testing and commissioning. 6. The exceedance could be due to saturation of the AC filter as an increase of VOCs concentration was observed.
Action Taken / Action to be Taken	The contractor has replaced all AC filter media in the last week of September 2018. (Photograph record attached as Appendix C .)
Remedial Works and Follow-up Actions	To avoid saturation of the filter media, it is recommended that the contractor should test the medium regularly or indicator medium should be used to provide an indication of the condition of the media.

Prepared by: Leah Pak, ET Representatives

Date: 22-November-2018

Appendix A

Monitoring Location

DRAWN	CHK	CHECKED	RS	APPROVED	DIP
SCALE	1:500/0A1 / 1:1000/0A3		DATE 12/02/15		
WORK NO.	DRAWING NO.				

DRAWING TITLE
SITE LAYOUT

STATUS
DRAFT ISSUE

PROJECT
ORGANIC WASTE TREATMENT FACILITIES
PHASE 1
EP/SF/6/10

INDEPENDENT CONSULTANTS
MEIN-HARDT

ENVIRONMENTAL TEAM
ARUP
Ove Arup & Partners Hong Kong Limited

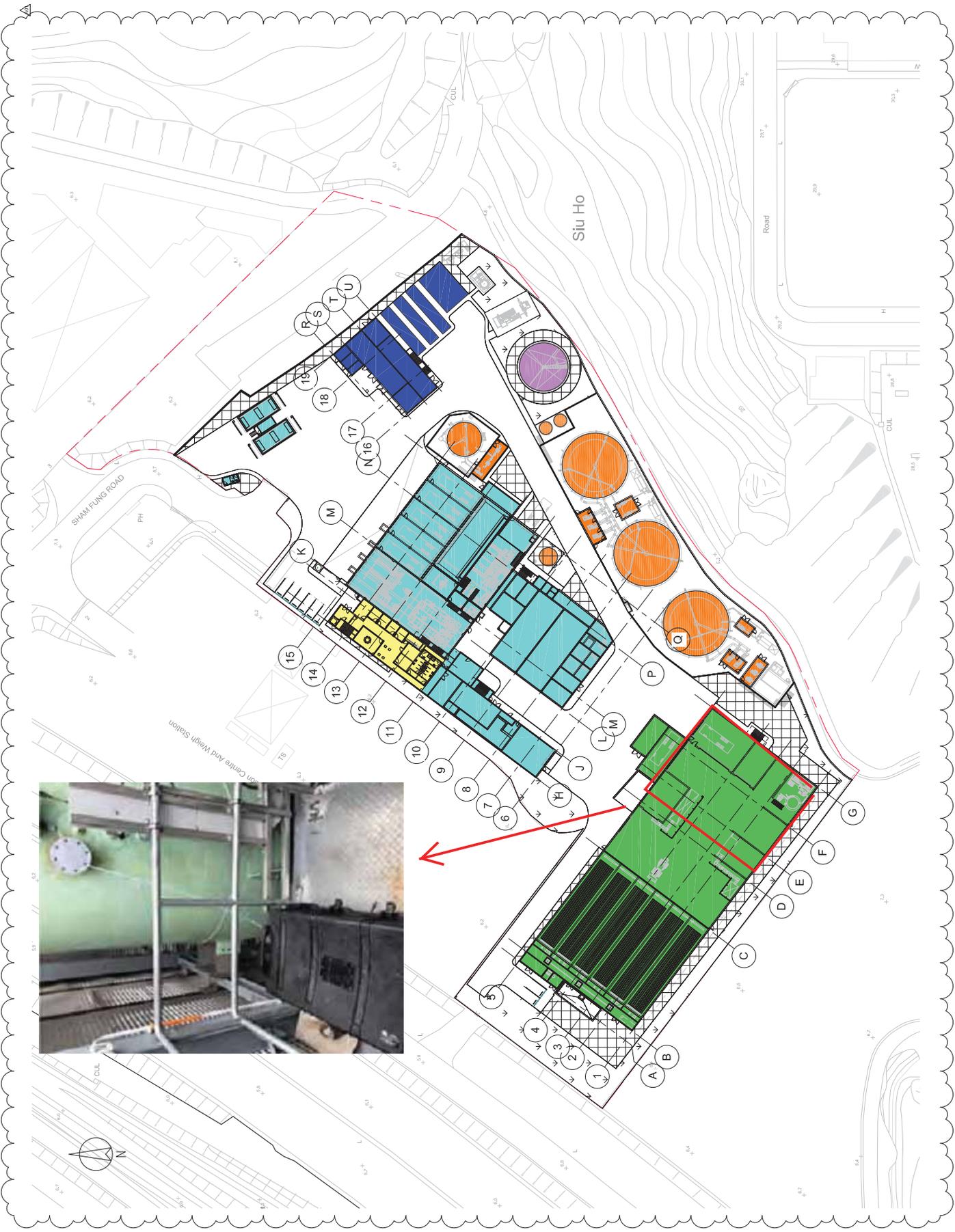
LEAD DESIGNER
OSCAR BIOENERGY JV

CONTRACTOR
ATAL & RosRoca

CLIENT'S CONSULTANT
AECOM
AECOM ASIA CO. LTD.

CLIENT
ENVIRONMENTAL PROTECTION DEPARTMENT
GOVERNMENT OF THE HKSAR

REV	DATE	BY	APP	DESCRIPTION
ADD	18/02/15	CHK	MRE	DRAFT ISSUE
ADD	05/03/15	CHK	MRE	MITCH BACKGROUND(S) UPDATED



Appendix B

Odour Sampling Report



CERTIFICATE OF ANALYSIS

CLIENT:	Oscar Bioenergy Joint Venture	WORK ORDER:	HK1847224
CONTACT:	Edwin Wong	LABORATORY:	Hong Kong
ADDRESS:	No. 5, Sham Fung Road, Siu Ho Wan, North Lantau Island, NT, Hong Kong	SUB-BATCH:	0
PROJECT:	Odour Monitoring for the Organic Resources Recovery Centre Phase 1 in Siu Ho Wan	DATE RECEIVED:	31 August 2018
SITE:	Organic Resources Recovery Centre Phase 1 (ORRC1)	DATE OF ISSUE:	18 September 2018
PO:	---	SAMPLE TYPE:	Air
		NO OF SAMPLES:	3

COMMENTS

Air sample(s) were collected by ALS Technichem (HK) staff on 31st August, 2018 at the Organic Resources Recovery Centre Phase 1 (ORRC1) in Siu Ho Wan for Odour Monitoring.

The sample(s) were analysed and reported on an as received basis.

NOTES

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.


Richard Fung
General Manager - Hong Kong



METHOD STATEMENT

A. Odour Concentration

1. Odour Sampling

Odour gas sample was collected by passive sampling technique. A Nalophan™ sampling bag was placed inside an air-tight sampler and then drawn to vacuum. Approximately 60 litre of gas sample was collected into the sampling bag for testing.

The odour sample was collected at the Organic Recovery Resources Centre Phase 1 (ORRC1) and sampling locations were shown in Appendix A1.

2. Olfactometry Testing

Odour concentration was determined by a Forced-choice Dynamic Olfactometer 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 by definition 1 OU_e/m^3 . The odour concentration is then expressed in terms of multiples of the detection threshold. The range of measurement including pre-dilution prior to the olfactometry analysis is typically from 10^1 OU_e/m^3 to 10^7 OU_e/m^3 .

Olfactometry Testing was performed by using the Scentroid™ SS600 Olfactometer. The testing was performed by at least five qualified panellists who have been selected through an n-butanol screening test.

All testing finished within 24 hours after sample receipt.



RESULT

1. Odour Concentration

Sample ID	Location	Sampling Date	Sampling Time	LOR (OU _E /Nm ³)	Odour Concentration (OU _E /Nm ³)	Characteristics of the odour detected of the gas sample	Volumetric Flow Rate (Nm ³ /min)	Emission rate (OU _E /hr)
HK1847224-001	CAPC Unit	31-Aug-18	11:04 – 11:07	11	444	Smell of Garbage	1261.1	33,600,000
HK1847224-002	CAPC Unit	31-Aug-18	11:08 – 11:11	11	476	Smell of Garbage	1261.1	36,020,000
HK1847224-003	Field Blank	31-Aug-18	--	11	<11	--	--	--

Remark:

1. LOR denotes limit of reporting.
2. The collected sample volume of the gas bag is sufficient for olfactometry analysis.
3. Field Blank containing pure nitrogen gas was collected and filled by ALS staff on site.
4. The volumetric flow rate used for calculation of the emission rate was provided by the client.



APPENDIX 1

A1. SITE CONDITIONS AND OBSERVATION

Location	Date	Time	Ambient Temperature (°C)	Relative Humidity (%)	Ambient Pressure (hPa)	Wind Speed (m/s)	Wind Direction (Degree)	Direction from Source ¹	Duration of Odour	On-Site Observation		Weather Condition
										Odour Nature	Possible Source	
CAPC Unit	31-08-18	11:04 -11:11	29.0	81.0	1008.0	1.6	309	NA	NA	No odour was smelled.	NA	Cloudy

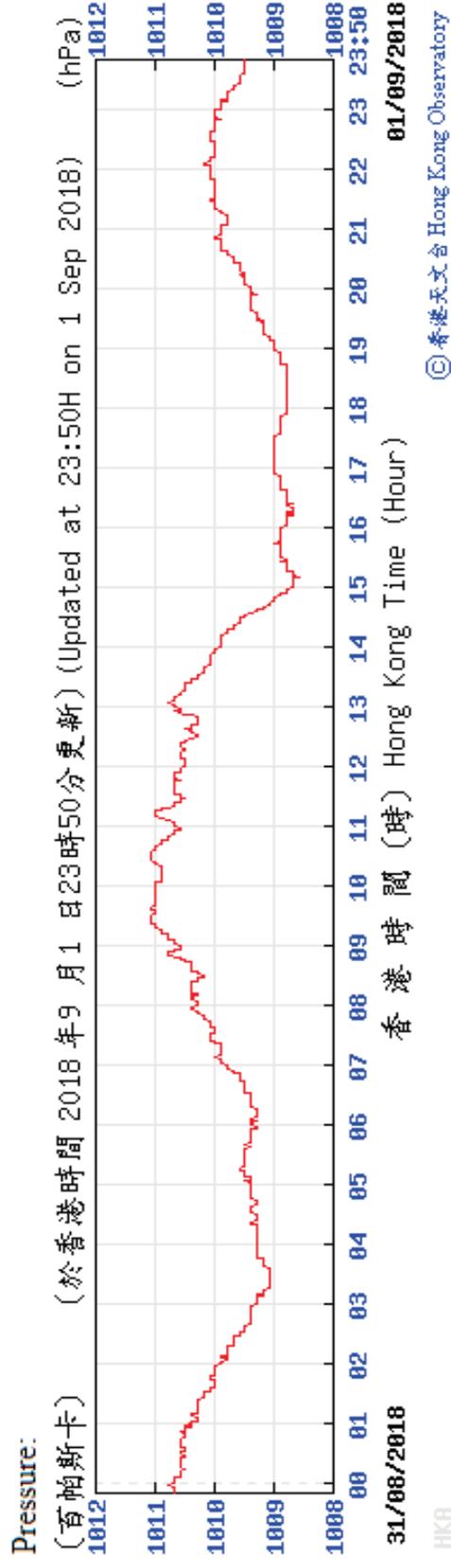
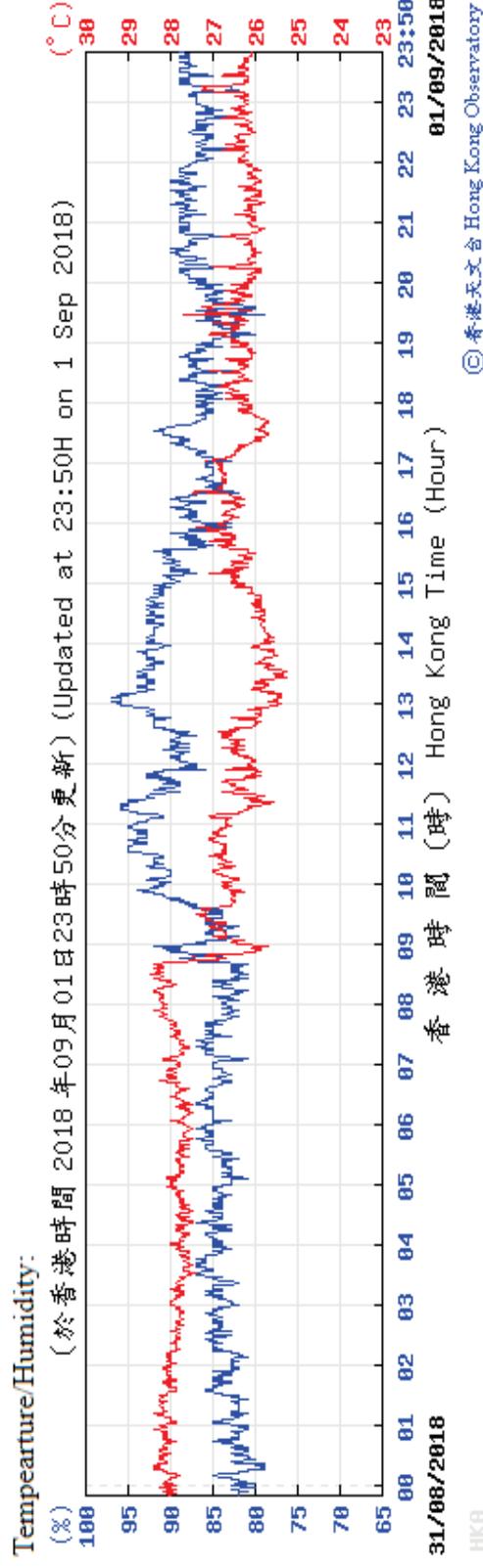
Note:

1. It was assumed that the exhaust of the CAPC Unit was from the odour source.



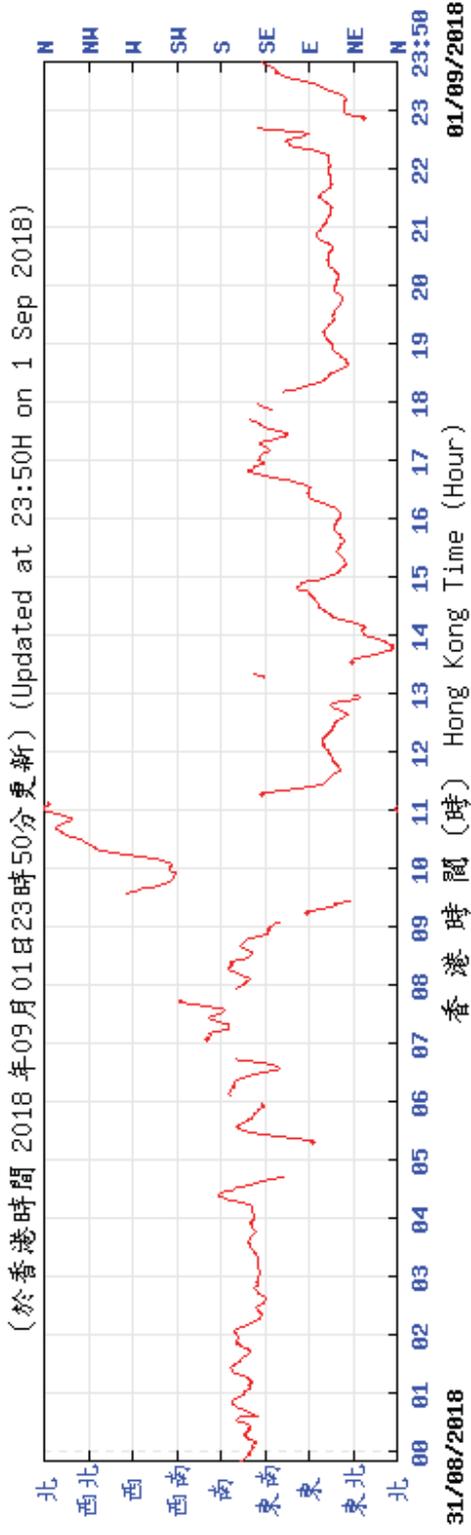
APPENDIX 2

A2. EXTRACT OF METEOROLOGICAL OBSERVATIONS FROM HONG KONG AIRPORT OBSERVATORY STATION

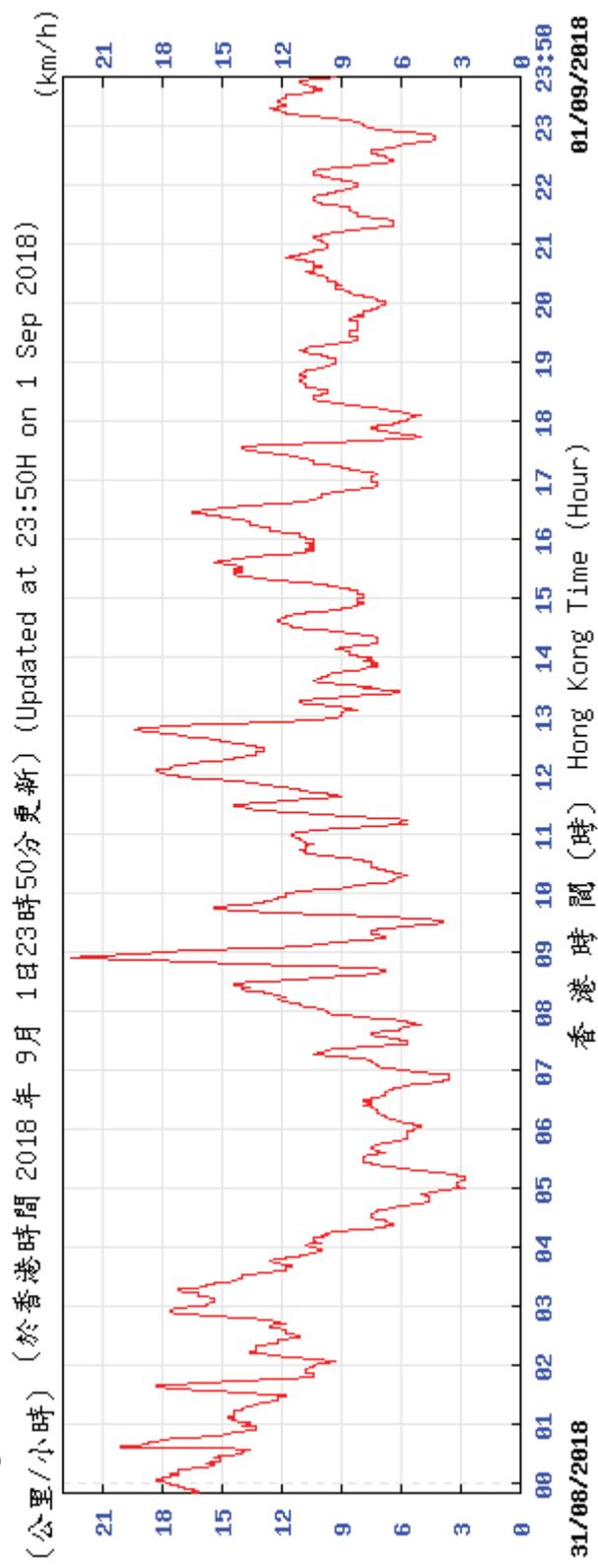




Wind Direction:



Wind Speed:



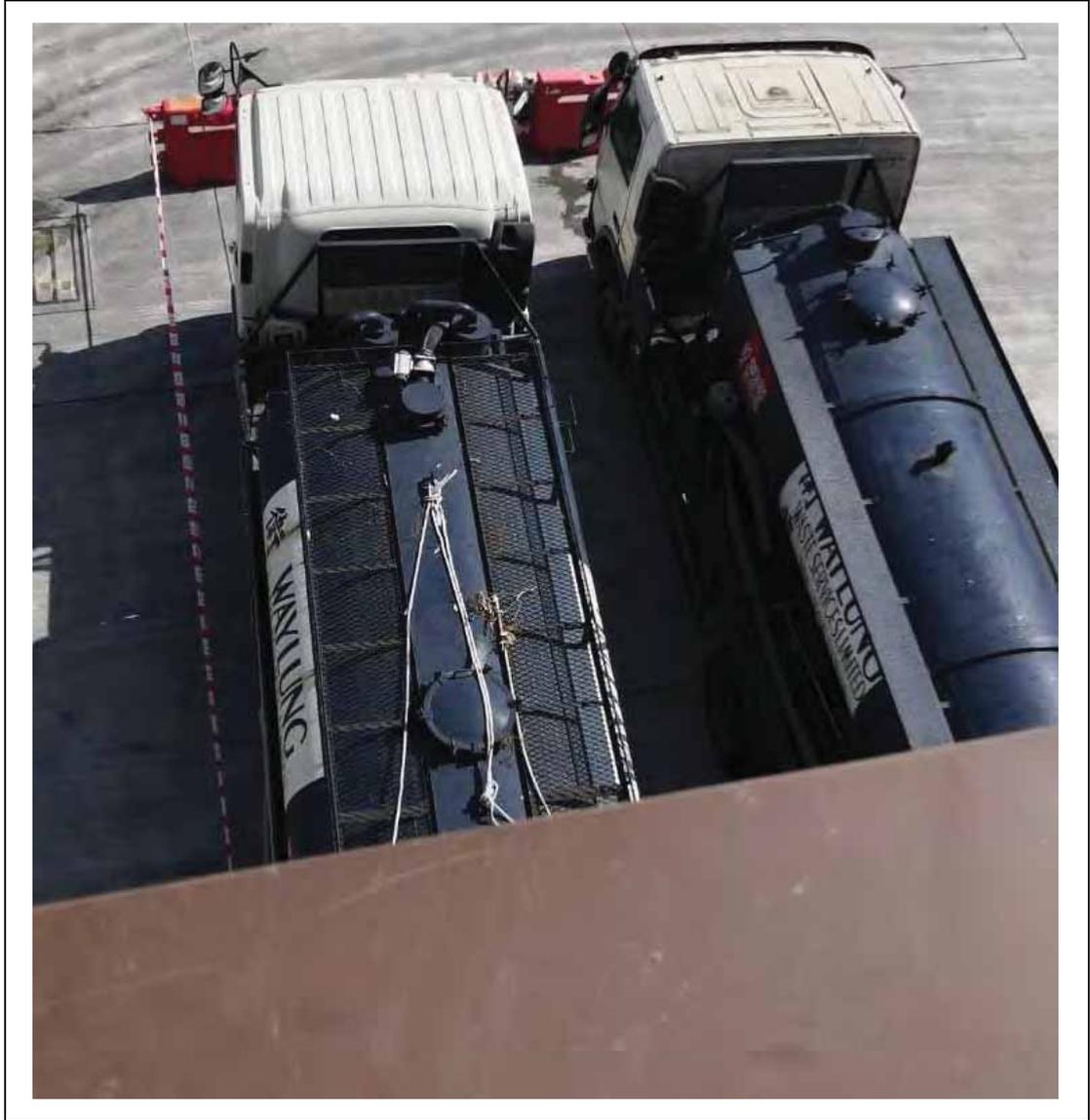
APPENDIX 3

A3. PHOTO OF THE SAMPLING LOCATION



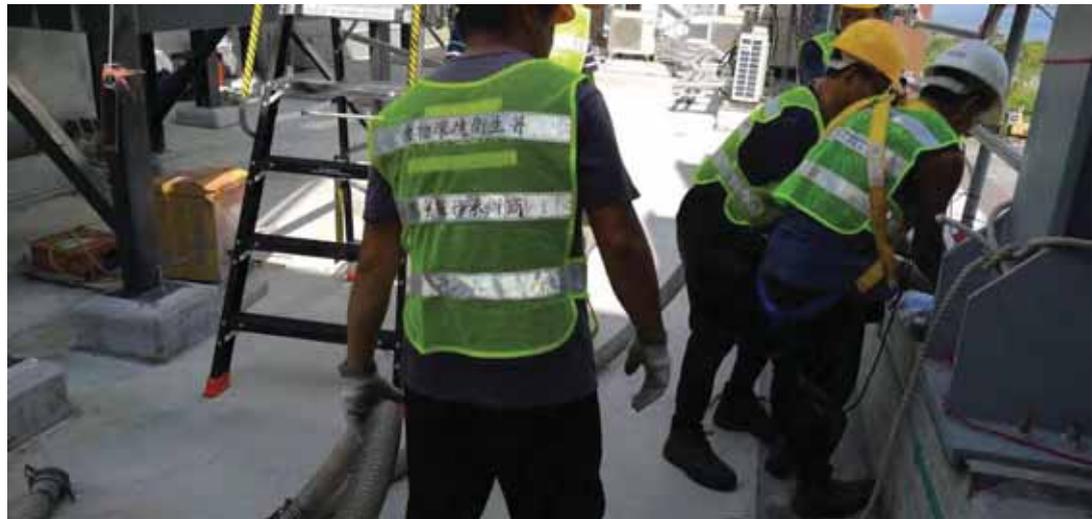
Annex C

Photograph Records





The Activate Carbon (ACs) were standby for replacement on site in mid-September 2018.



The ACs were being replaced by on site workers.

Investigation Report of Odour Sampling Exceedances

Date	5, 12, 19 and 26 October 2018; 1 and 5 November 2018
Time	Sampling times were shown in Appendix D .
Monitoring Location	Centralized Air Pollution Control (CAPC) Unit ((Detailed location and photos shown on the marked drawing DR-OAP-20-0-CA-1001 attached as Appendix C)
Weather	Fine
Parameter	Odour
Exceedance Description	<ol style="list-style-type: none"> 1. On 5, 12, 19, 26 October 2018 and 1, 5 November 2018, air samples were collected from the outlet of the Centralised Air Pollution Control (CAPC) unit by ALS for measurement of the Odour Intensity by olfactometry analysis at the laboratory. According to the EM&A Manual and EP requirements, it is considered an exceedance if the odour level is more than 220 OU/Nm³. the odour level of the odour samples collected from the CAPC unit have exceeded the odour limits stated in Table 2.2 of the EM&A Manual. The detail sampling results are shown in Appendix D. 2. The plant was operated normally. Odour emitting activities, including wastewater treatment plant, waste receiving pretreatment, AD process, sludge dewatering and composting were operating on those sampling days. The CAPC system was operating during the odour sampling. 3. The plant received an average of 100 tonnes of SSOW daily in the reporting period. 4. The contractor reported that CAPCS system was running with 1 of 2 line chemical scrubber, wet scrubber and venturi scrubber with activated carbon (AC) filter. Another 1 of 2 line chemical scrubber, wet scrubber and venturi scrubber were not operating at the time of the sampling as they are still under testing and commissioning. The exceedances could be due to saturation of the AC filter as an increase of VOCs concentration was observed.
Action Taken / Action to be Taken	The contractor has replaced all AC filter media in mid (15 th - 20 th) of November 2018 (Photograph record attached as Appendix E). The odour sampling collected on 23 November 2018 from CAPCs complied with EM&A Manual.
Remedial Works and Follow-up Actions	To avoid saturation of the filter media, it is recommended that the contractor should test the medium regularly or indicator medium should be used to provide an indication of the condition of the media. ET will carry out follow-up audit regarding the progress next month.

OSCAR Bioenergy Joint Venture
EP/SP/61/10 – Organic Resources Recovery Centre Phase 1

Prepared by: Leah Pak, ET Representatives

Date: 10-December-2018

Appendix C

Monitoring Location

Appendix D

Odour Sampling Results Summary

OSCAR Bioenergy Joint Venture
 EP/SP/61/10 – Organic Resources Recovery Centre Phase 1

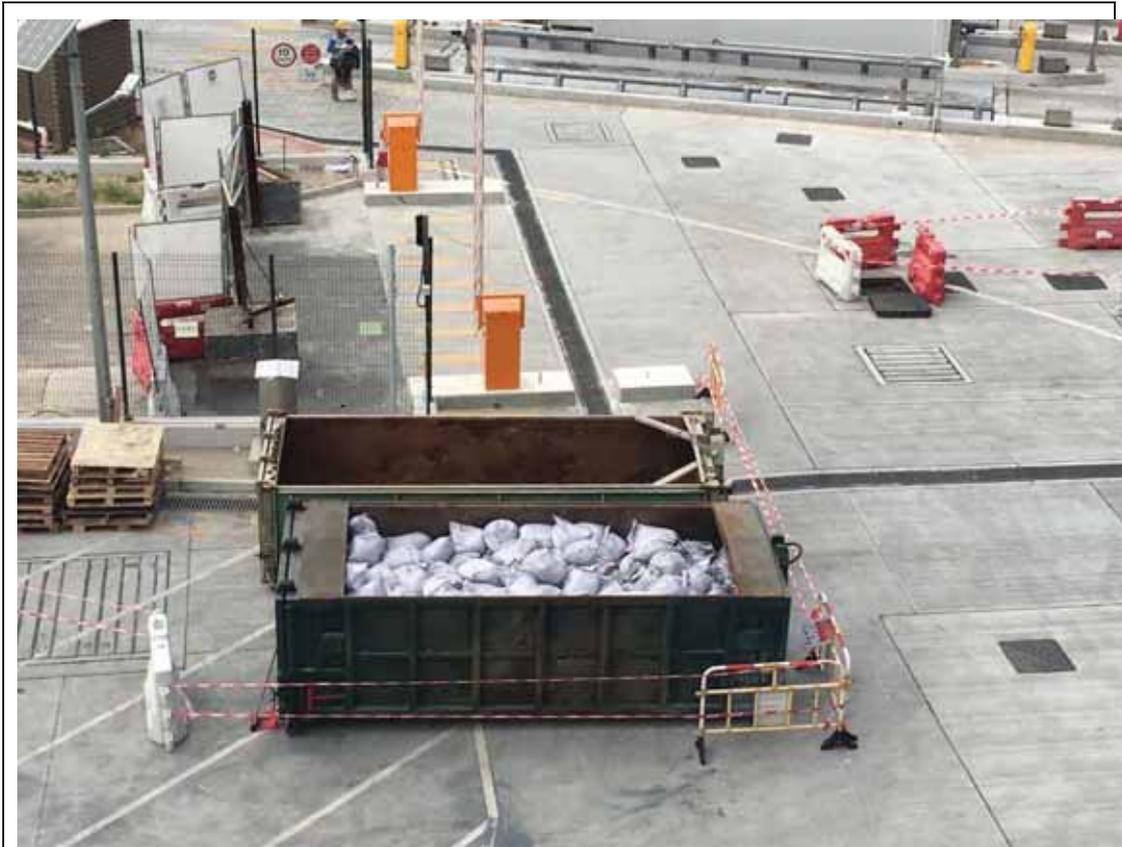
Sampling Date	Sampling Time	Odour Concentration (OU /Nm ³) ^{Note}
5 Oct 2018	11:05-11:10	1204
5 Oct 2018	11:11-11:18	1087
12 Oct 2018	15:08-15:12	2107
12 Oct 2018	15:12-15:16	2463
19 Oct 2018	11:01-11:05	2273
19 Oct 2018	11:06-11:09	2273
26 Oct 2018	10:35-10:40	1817
26 Oct 2018	10:40-10:44	1668
1 Nov 2018	11:08-11:12	1283
1 Nov 2018	11:13-11:16	1016
5 Nov 2018	11:11-11:14	1016
5 Nov 2018	11:15-11:17	1016
5 Nov 2018	11:31-11:35	1016
5 Nov 2018	11:36-11:40	933
23 Nov 2018	11:08-11:13	134
23 Nov 2018	11:14-11:19	144

Note: According to the EM&A Manual and EP requirements, it is considered an exceedance if the odour level is more than 220 OU/Nm³.

Appendix E

Photographs Taken On-Site

OSCAR Bioenergy Joint Venture
EP/SP/61/10 – Organic Resources Recovery Centre Phase 1



The activated carbons (ACs) were standby for replacement on site in mid-November 2018.



The AC bags were being lifted to roof of the Building 2 and ready for replacement.



The ACs were being replaced by on site workers.