OSCAR Bioenergy Joint Venture

Contract No. EP/SP/61/10 Organic Resources Recovery Centre (Phase 1): *Twenty-third Quarterly EM&A Summary Report*

1 December 2020 – 28 February 2021

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Meinhardt Infrastructure and Environment Limited

Organic Resources Recovery Centre, Phase I

Quarterly EM&A Report

(1 Dec 2020 – 28 Feb 2021)

(April 2021)

Verified by:	W. K. Chiu
Position:	Independent Environmental Checker
Date:	29 April 2021

OSCAR Bioenergy Joint Venture

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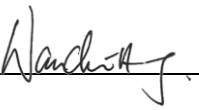
Reference 0279222

For and on behalf of ERM-Hong Kong, Limited

Approved by: Frank Wan

Signed: 

Position: Partner

Certified by:
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Date: 28 April 2021

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EXECUTIVE SUMMARY

The construction works of ***No. EP/SP/61/10 Organic Resources Recovery Centre Phase 1 (the Project)*** commenced on 21 May 2015. This is the 23rd quarterly Environmental Monitoring and Audit (EM&A) report presenting the EM&A works carried out during the period from 1 December 2020 to 28 February 2021 in accordance with the EM&A Manual. Substantial completion of the construction works was confirmed on 3 December 2018. In the meantime, the operation phase EM&A programme had commenced in March 2019. Substantial Completion in respect of substantial part of the Works was confirmed on 24 February 2020. The construction phase EM&A programme was completed in the end of February 2020.

Summary of Works undertaken during the Reporting Month

Works undertaken in the reporting month included:

- Operation of the Project, including organic waste reception, and operation of the pre-treatment facilities, anaerobic digesters, composting facilities, air pollution control systems, on-line emission monitoring system for the Centralised Air Pollution Control Unit (CAPCS), Co-generation Units (CHP)s and Ammonia Stripping Plant (ASP), and the wastewater treatment plant; and

- Process fine-tune, including adjustment of the ASP with new treatment media, modification of Continuous Environmental Monitoring System (CEMS) and Supervisory Control and Data Acquisition System (SCADA) rectification and improvement works following equipment failures and the alteration of different operation modes and measures to adapt to the high variation of SSOW nature and sources.

Environmental Monitoring and Audit Progress

Air Quality Monitoring

Exceedances on NO_x from CHP and NO_x, VOC (including methane) and NH_3 from ASP were recorded on the on-line monitoring system in December 2020. Exceedances on Dust, NO_x and HCl from CHP and CO, NO_x, VOC (including methane) and NH_3 from ASP were recorded on the on-line monitoring system in January 2021. Exceedances on NO_x and SO_2 from CHP and NO_x and NH_3 from ASP were recorded on the on-line monitoring system in February 2021. It should be noted that measurements recorded under abnormal operating conditions, e.g. start up and stopping of stacks, unstable operation, test runs and interference of sensor, are disregarded.

Exceedances in emission parameters of CAPCS, CHP and ASP were found to be a result of problems with system maintenance at CAPCS, low biogas loading at CHP and incomplete combustion of biogas at ASP.

The Contractor has implemented mitigation measures to control the exceedance (including arranging for the supplier of CHP to perform on-site

adjustment to improve CHP performance and tuning the thermal combustion unit of the ASP to optimise combustion efficiency and overall performance).

The Contractor is recommended to closely monitor the processes of the modification of the ASP and the post-modification monitoring of emission level to avoid any exceedance.

Odour

No odour patrol was carried out in this reporting period.

Water Quality

No non-compliance to the effluent discharge limit stipulated in the discharge licence issued by the EPD under the *Water Pollution Control Ordinance* was recorded during this reporting period.

Waste Management

Waste generated from the operation of the Project includes chemical waste, waste generated from pre-treatment process and general refuse.

8,686 L of chemical waste was collected by licenced waste collector from the operation of the Project.

1,697.19 tonnes of waste generated from pre-treatment process from the operation of the Project was disposed of at landfill. Among the recyclable waste generated from pre-treatment process from the operation of the Project, 0.00 tonnes of metals, 0.00 tonnes of papers/ cardboard packing and 0.00 tonnes of plastics were sent to recyclers for recycling during the reporting period.

Around 8.18 tonnes of general refuse from the operation of the Project was disposed of at landfill. Among the recycled general refuse from the operation of the Project, 0.00 tonnes of metals, 0.00 tonnes of papers/ cardboard packing and 0.00 tonnes of plastics were sent to recyclers for recycling during the reporting period.

Findings of Environmental Site Audit

A summary of the monitoring activities undertaken in this reporting period is listed below:

- Joint Environmental Site Inspections 3 times
- Landscape & Visual Inspections 3 times

Monthly joint environmental site inspections were carried out. The environmental control/ mitigation measures (related to air quality, water quality, waste (including land contamination prevention), hazard-to-life and landscape and visual) recommended in the approved EIA Report and the EM&A Manual were properly implemented by the Contractor during the reporting month.

Environmental Exceedance/Non-conformance/Compliant/Summons and Prosecution

Exceedances for the air emission limits for the CAPCS, CHP and ASP stacks were recorded during the reporting period.

No complaint/ summon/prosecution was received in this reporting period.

Future Key Issues

Activities to be undertaken in the next reporting month include:

- Operation of the Project.
- Modification of the CHP and ASP to control the air emission.

1 INTRODUCTION

ERM-Hong Kong, Limited (ERM) was appointed by OSCAR Bioenergy Joint Venture (the Contractor) as the Environmental Team (ET) to undertake the construction Environmental Monitoring and Audit (EM&A) programme for the ***Contract No. EP/SP/61/10 of Organic Waste Treatment Facilities Phase I,*** which the project name has been updated to ***Organic Resources Recovery Centre (Phase I) (the Project)*** since November 2017. ERM was also appointed by the Contractor to undertake the operation EM&A programme starting 1 March 2019.

1.1 PURPOSE OF THE REPORT

This is the 23rd Quarterly EM&A report which summarises the monitoring results and audit findings for the EM&A programme during the reporting period from **1 December 2020** to **28 February 2021**.

1.2 STRUCTURE OF THE REPORT

The structure of the report is as follows:

Section 1: Introduction
It details the scope and structure of the report.

Section 2: Project Information
It summarises the background and scope of the Project, site description, project organisation and status of the Environmental Permits (EP)/licences.

Section 3: Environmental Monitoring and Audit Requirements
It summarises the environmental monitoring requirements including monitoring parameters, programmes, methodologies, frequency, locations, Action and Limit Levels, Event/Action Plans, as well as environmental audit requirements as recommended in the EM&A Manual and approved EIA report.

Section 4: Monitoring Results
It summarises monitoring results of the reporting period.

Section 5: Site Audit
It summarises the audit findings of the environmental as well as landscape and visual site audits undertaken within the reporting period.

Section 6: Environmental Non-conformance
It summarises any exceedance of environmental performance standard, environmental complaints and summons received within the reporting period.

Section 7: Further Key Issues

It summarises the impact forecast for the next reporting month.

Section 8: Conclusions

2 PROJECT INFORMATION

2.1 BACKGROUND

The Organic Resources Recovery Centre (ORRC) Phase I development (hereinafter referred to as "the Project") is to design, construct and operate a biological treatment facility with a capacity of about 200 tonnes per day and convert source-separated organic waste from commercial and industrial sectors (mostly food waste) into compost and biogas through proven biological treatment technologies. The location of the Project site is shown in *Annex A*.

The environmental acceptability of the construction and operation of the Project had been confirmed by findings of the associated Environmental Impact Assessment (EIA) Study completed in 2009. The Director of Environmental Protection (DEP) approved this EIA Report under the *Environmental Impact Assessment Ordinance* (EIAO) (Cap. 499) in February 2010 (Register No.: AEIAR-149/2010) (hereafter referred to as the approved EIA Report). Subsequent Report on Re-assessment on Environmental Implications and Report on Re-assessment on Hazard to Life Implications were completed in 2013, respectively.

An Environmental Permit (EP) (No. EP-395/2010) was issued by the DEP to the EPD (Project Team), the Permit Holder, on 21 June 2010 and varied on 18 March 2013 (No. EP-395/2010/A) and 21 May 2013 (No. EP-395/2010/B), respectively. The Design Build and Operate Contract for the ORRC Phase 1 (Contract No. EP/SP/61/10 Organic Resources Recovery Centre (Phase 1) (the Contract)) was awarded to SITA Waste Services Limited, ATAL Engineering Limited and Ros-Roca, Sociedad Anonima jointly trading as the OSCAR Bioenergy Joint Venture (OSCAR or the Contractor). A Further EP (No. FEP-01/395/2010/B) was issued by the DEP to the OSCAR on 16 February 2015. Variation to both EPs (Nos. EP-395/2010/B and FEP-01/395/2010/B) were made in December 2015. The latest EPs, Nos. EP-395/2010/C and FEP-01/395/2010/C, were issued by the DEP on 21 December 2015.

Under the requirements of Condition 5 of the EP (No. FEP-01/395/2010/C), an Environmental Monitoring and Audit (EM&A) programme as set out in the approved EM&A Manual (hereinafter referred to as EM&A Manual) is required to be implemented during the construction and operation of the Project. ERM-Hong Kong, Ltd (ERM) has been appointed by OSCAR as the Environmental Team (ET) for the construction phase EM&A programme and the Monitoring Team (MT) for the operation phase EM&A programme for the implementation of the EM&A programme in accordance with the requirements of the EP and the approved EM&A Manual.

The construction works commenced on 21 May 2015. The operation phase of

the EM&A programme commenced on 1 March 2019 (1). The construction phase EM&A programme was completed in the end of February 2020.

2.2 GENERAL SITE DESCRIPTION

The Project Site is located at Siu Ho Wan in North Lantau with an area of about 2 hectares. The layout of the Project Site is illustrated in *Annex A*. The facility received and treated an average of 100 tonnes of source separated organic waste per day during the reporting month.

2.3 MAJOR ACTIVITIES UNDERTAKEN

A summary of the major activities undertaken in the reporting period is shown in *Table 2.1*.

Table 2.1 Summary of Activities Undertaken in the Reporting Period

Activities Undertaken in the Reporting Period
• Systems being operated – waste reception, pre-treatment, CAPCS extraction, the digesters, the centrifuge, the composting tunnels the desulphurisation, the emergency flare, the CHPs, the ASP and the biological waste water treatment plant (about 100-130 t/d SSOW input); and • Process fine-tune – adjustment of the ASP operational parameters with new treatment media, CEMS/SCADA modification and improvement work following equipment failures and the alteration of different operation modes and measures to adapt to the high variation of SSOW nature and sources.

2.4 PROJECT ORGANISATION AND MANAGEMENT STRUCTURE

The project organisation chart and contact details are shown in *Annex B*.

2.5 STATUS OF ENVIRONMENTAL APPROVAL DOCUMENTS

A summary of the valid permits, licences, and/or notifications on environmental protection for this Project is presented in *Table 2.2*.

Table 2.2 Summary of Environmental Licensing, Notification and Permit Status

Permit/ Licences/ Notification	Reference	Validity Period	Remarks
Environmental Permit	FEP-01/395/2010/C	Throughout the Contract	Permit granted on 21 December 2015
Notification of Construction Works under the Air Pollution Control	Ref No. 386715	Throughout the Contract	-

(1) As some of the minor items are yet to be closed out in March 2019, the construction phase EM&A programme and Operation Phase EM&A programme were undertaking in parallel in March 2019.

Permit/ Licences/ Notification	Reference	Validity Period	Remarks
(Construction Dust) Regulation			
Effluent Discharge License	WT00024352-2016	3 June 2016 – 30 June 2021	Approved on 3 June 2016
Chemical Waste Producer Registration	WPN 5213-961-O2231-01	Throughout the Contract	Approved on 29 April 2015
Chemical Waste Producer Registration	WPN 5213-961-O2231-02	Throughout the implementation of the Project	Approved on 10 November 2017
Waste Disposal Billing Account	Account number: 702310	Throughout the Contract	-

3 ENVIRONMENTAL MONITORING AND AUDIT REQUIREMENTS

3.1 ENVIRONMENTAL MONITORING

The air quality (including odour) monitoring to be carried out during the commissioning and operation phase of the Project are described below. Although water quality monitoring is not required for the operation phase under the EM&A programme, there are water quality monitoring requirement under the Water Discharge Licence of the plant under the *Water Pollution Control Ordinance* (WPCO). As part of this EM&A programme, the monitoring results will be reviewed to check the compliance with the WPCO requirements.

3.1.1 Air Quality

According to the EM&A Manual and EP requirements, stack monitoring are required during the commissioning and operation phase of the Project.

On-line monitoring (using continuous environmental monitoring system (CEMS) shall be carried out for the centralised air pollution unit (CAPCS), cogeneration units (CHP) and the ammonia stripping plant (ASP) during the commissioning and operation phase. The calibration certificate for the on-line monitoring equipment is provided in *Annex C*.

The monitoring data is transmitted instantaneously to EPD (Regional Office) by telemetry system.

When the on-line monitoring for certain parameter cannot be undertaken, monitoring will be carried out using the following methodology approved by the EPD.

Table 3.1 Sampling and Laboratory Analysis Methodology

Parameters	Method	Stacks to be Monitored
Gaseous and vaporous organic substances (including methane)	USEPA Method 18	• CAPCS • CHP • ASP
Particulate	USEPA Method 5	• CAPCS • CHP • ASP
Carbon monoxide (CO)	USEPA Method 10	• CHP • ASP
Nitrogen oxides (NO_x)	USEPA Method 7E	• CHP • ASP
Sulphur dioxide (SO_2);	USEPA Method 6	• CHP • ASP
Hydrogen chloride (HCl)	USEPA Method 26A	• CHP • ASP

Parameters	Method	Stacks to be Monitored
Hydrogen fluoride (HF)	USEPA Method 26A	• CHP • ASP
Oxygen (O_2);	USEPA Method 3A	• CAPCS • CHP • ASP
Velocity and Volumetric Flow	USEPA Method 2	• CAPCS • CHP • ASP
Ammonia (NH_3)	USEPA CTM 027	• ASP
Odour (including NH_3 and H_2S)	EN 13725	• CAPCS
Water vapour content (continuous measurement of the water vapour content should not be required if the sample exhaust gas is dried before the emissions are analysed)	USEPA Method 4	• CAPCS • CHP • ASP
Temperature	USEPA Method 4	• CAPCS • CHP • ASP

With reference to the EM&A Manual, the air emission of the stacks shall meet the following emission limits as presented in *Tables 3.2* to *3.5*.

Table 3.2 Emission Limit for CAPCS Stack

Parameter	Emission Level (mg/Nm^3) (a)
VOCs (including methane)	680
Dust (or Total Suspended Particulates (TSP))	6
Odour (including NH_3 & H_2S)	220 (b)

Notes:
(a) Hourly average concentration
(b) The odour unit is OU/Nm^3

Table 3.3 Emission Limit for CHP Stack

Parameter	Maximum Emission Level (mg/Nm^3) (a) (b)
Dust (or Total Suspended Particulates)	15
Carbon Monoxide	650
NO_x	300
SO_2	50
NMVOCs (c)	150
VOCs (including methane) (d)	1,500
HCl	10
HF	1

Notes:
(a) All values refer to an oxygen content in the exhaust gas of 6% and dry basis.
(b) Hourly average concentration
(c) NMVOCs should be monitored by gas sampling and laboratory analysis at an agreed interval. For the first 12 months (starting from August 2019), monitoring should be carried out at quarterly intervals. The monitoring frequency should then be reduced to half-yearly for next 12 months (starting from August 2020).

Parameter	Maximum Emission Level (mg/Nm^3) [(a) (b)]
(d) The VOCs emission limit include methane as biogas is adopted as fuel in the combustion process.	

Table 3.4 Emission Limit for ASP Stack

Parameter	Maximum Emission Level (mg/Nm^3) [(a) (b)]
Dust (or Total Suspended Particulates)	5
Carbon Monoxide	100
NOx	200
SO_2	50
VOCs (including methane) [(c)]	20
NH_3	35
HCl	10
HF	1

Notes:
(a) All values refer to an oxygen content in the exhaust gas of 11% and dry basis.
(b) Hourly average concentration
(c) The VOCs emission limit include methane as biogas is adopted as fuel in the combustion process.

Table 3.5 Emission Limit for Standby Flaring Gas Unit [(1)]

Parameter	Maximum Emission level (mg/Nm^3) [(a) (b)]
Dust (or Total Suspended Particulates)	5
Carbon Monoxide	100
NO_x	200
SO_2	50
VOCs (including methane) [(c)]	20
HCl	10
HF	1

Notes:
(a) All values refer to an oxygen content in the exhaust gas of 11% and dry basis.
(b) Hourly average concentration
(c) The VOCs emission limit include methane as biogas is adopted as fuel in the combustion process.

3.1.2 Odour

To determine the effectiveness of the proposed odour mitigation measures and to ensure that the operation of the ORRC1 will not cause adverse odour impacts, odour monitoring of the CAPCS stack (see *Section 3.1.1*) and odour patrol will be carried out.

Odour patrol shall be conducted by independent trained personnel/ competent persons in summer months (i.e. from July to September) for the first two operational years of ORRC1 at monthly intervals along an odour patrol route at the Project Site boundary as shown in *Annex A*.

(1) A standby facility. Only operate when the CHPs are not in operation or when the biogas generated exceeded the utilisation rate of the CHPs.

The perceived odour intensity is divided into 5 levels. *Table 3.6* describes the odour intensity for different levels.

Table 3.6 Odour Intensity Level

Level	Odour Intensity
0	Not detected. No odour perceived or an odour so weak that it cannot be easily characterised or described
1	Slight identifiable odour, and slight chance to have odour nuisance
2	Moderate identifiable odour, and moderate chance to have odour nuisance
3	Strong identifiable, likely to have odour nuisance
4	Extreme severe odour, and unacceptable odour level

Table 3.7 shows the action level and limit level to be used for odour patrol. Should any exceedance of the action and limit levels occurs, actions in accordance with the event and action plan in *Table 3.8* should be carried out.

Table 3.7 Action and Limit Levels for Odour Nuisance

Parameter	Action Level	Limit Level
Odour Nuisance (from odour patrol)	When one documented compliant is received [(a)], or Odour Intensity of 2 is measured from odour patrol.	Two or more documented complaints are received [(a)] within a week; or Odour intensity of 3 or above is measured from odour patrol.

Note:
(a) Once the complaint is received by the Project Proponent (EPD), the Project Proponent would investigate and verify the complaint whether it is related to the potential odour emission from the ORRC1 and its on-site wastewater treatment unit.

Table 3.8 Event and Action Plan for Odour Monitoring

Event	Action	
	Person-in-charge of Odour Monitoring	**Project Proponent [(a)]**
Action Level		
Exceedance of action level (Odour Patrol)	1. Identify source/reason of exceedance; 2. Repeat odour patrol to confirm finding.	1. Carry out investigation to identify the source/reason of exceedance. Investigation should be completed within 2 weeks; 2. Rectify any unacceptable practice; 3. Implement more mitigation measures if necessary; 4. Inform Drainage Services Department (DSD) or the operator of the Siu Ho Wan Sewage Treatment Works (SHWSTW) if exceedance is considered to be caused by the operation of the SHWSTW. 5. Inform North Lantau Refuse Transfer Station (NLTS) operator if exceedance is considered to be caused by the operation of NLTS.

Exceedance of action level (Odour Complaints)	1. Identify source/reason of exceedance; 2. Carry out odour patrol to determinate odour intensity.	1. Carry out investigation and verify the complaint whether it is related to potential odour emission from the nearby SHWSTW; 2. Carry out investigation to identify the source/reason of exceedance. Investigation should be completed within 2 weeks; 3. Rectify any unacceptable practice; 4. Implement more mitigation measures if necessary; 5. Inform DSD or the operator of the SHWSTW if exceedance is considered to be caused by the operation of the SHWSTW. 6. Inform NLTS operator if exceedance is considered to be caused by the operation of NLTS.
Limit Level		
Exceedance of limit level	1. Identify source/reason of exceedance; 2. Inform EPD; 3. Repeat odour patrol to confirm findings; 4. Increase odour patrol frequency to bi-weekly; 5. Assess effectiveness of remedial action and keep EPD informed of the results; 6. If exceedance stops, cease additional odour patrol.	1. Carry out investigation to identify the source/reason of exceedance. Investigation should be completed within 2 week; 2. Rectify any unacceptable practice; 3. Formulate remedial actions; 4. Ensure remedial actions properly implemented; 5. If exceedance continues, consider what more/enhanced mitigation measures should be implemented; 6. Inform DSD or the operator of the SHWSTW if exceedance is considered to be caused by the operation of the SHWSTW.

Note:
(a) Project Proponent shall identify an implementation agent.

3.2 *SITE AUDIT*

Environmental mitigation measures (related to air quality, water quality, waste, land contamination, hazard-to-life, and landscape and visual) to be implemented during the operation phase of the Project are recommended in the approved EIA Report and EM&A Manual and are summarised in *Annex D*. Monthly site audits for operation phase will be carried out to check the implementation of these measures.

3.2.1 *Water Quality*

Compliance audits are to be undertaken to ensure that a valid discharge licence has been issued by EPD prior to the discharge of effluent from the operation of the Project site. The audit shall be conducted to ensure that the effluent quality is in compliance with the discharge licence requirements. The effluent quality shall meet the discharge limits as described in *Table 3.9*.

Table 3.9 Discharge Limits for Effluent

Parameters	Discharge Limit (mg/L)
Flow Rate (m^3/day)	685
pH (pH units)	6-10 (a)
Suspended Solids	800
Biochemical Oxygen Demand (5 days, 20°)	800
Chemical Oxygen Demand	2,000
Oil & Grease	40
Total Nitrogen	200
Total Phosphorus	50
Surfactants (total)	25

Note:
(a) Range.

3.2.2 Landscape and Visual

In accordance with EM&A Manual, the landscape and visual mitigation measures shall be implemented.

For operation phase, site inspection shall be conducted once a month for the first year of operation of the Project. All measures as stated in the implementation schedule of the EM&A Manual (see *Annex D*), including compensatory planting, undertaken by both the Contractor and the specialist Landscape Sub-Contractor during the first year of the operation phase shall be audited by a Registered Landscape Architect (RLA) to ensure compliance with the intended aims of the measures and the effectiveness of the mitigation measures.

4 MONITORING RESULTS

4.1 AIR QUALITY

4.1.1 Commissioning Phase Monitoring

Monitoring results of air quality parameters from stack emissions of the centralised air pollution control system, the ammonia stripping plant and the cogeneration units will be provided once available to show compliance with the monitoring requirements stated in the EM&A Manual (Rev. F) to support the termination of the construction phase EM&A programme.

4.1.2 Operation Phase Monitoring

The concentrations of concerned air pollutants emitted from the stacks of the CAPCS, CHP, and ASP during the reporting period are monitored on-line by the continuous environmental monitoring system (CEMS). During the reporting period, there is no need to operate the standby flare and therefore no monitoring of the flare stack was undertaken.

With reference to the emission limits shown in *Tables 3.2, 3.3* and *3.4*, the hourly average concentrations and the number of exceedances of the concerned air emissions monitored for the CAPCS, CHP and ASP during this reporting period are presented in *Tables 4.1* to *4.5*.

It should be noted that measurements recorded under abnormal operating conditions, e.g. start up and stopping of stacks, unstable operation, test runs and interference of sensor, are disregarded.

Table 4.1 Hourly Average of Parameters Recorded for CAPCS

Parameter	Range of Hourly Average Conc. (mg/Nm^3)	Emission Limit (mg/Nm^3)	Exceedance Identified	Remarks
VOCs (including methane)	0 – 520	680	Nil	Nil
Dust (or TSP)	0 – 5.77	6	Nil	Nil
Odour (including NH_3 & H_2S) (b)	0 – 217.19	220	Nil	Nil

Note:
(a) The odour unit is OU/Nm^3.

Table 4.2 Hourly Average of Parameters Recorded for CHP 1

Parameter	Range of Hourly Average Conc. (mg/Nm³) [a]	Max. Emission Limit (mg/Nm³)	Exceedance Identified	Remarks
Dust (or TSP)	0 – 169	15	Identified [d]	Low biogas loading resulting in low CHP efficiency.
Carbon Monoxide	0 – 374	650	Nil	Nil
NO_x	0 – 399	300	Identified [e]	Low biogas loading resulting in low CHP efficiency. Supplier had been arranged to fine-tune the equipment. Close monitoring of the biogas loading is performed to prevent further exceedance.
SO_2	0 – 28	50	Nil	Nil
NMVOCs [b]	Nil	150	Nil	Nil
VOCs (including methane) [c]	0 – 808	1,500	Nil	Nil
HCl	0 – 35	10	Identified [f]	Low biogas loading resulting in low CHP efficiency.
HF	0.0 – 0.0	1	Nil	Nil

Notes:

(a) All values refer to an oxygen content in the exhaust gas of 6% and dry basis.

(b) No sampling was undertaken at CHP 1 as biogas production rate could not sustain the operation of the CHP stack for the scheduled sampling on 8 February 2021.

(c) The VOCs emission limit include methane as biogas is adopted as fuel in the combustion process.

(d) 2 numbers of exceedances on Dust were identified on 7 January 2021.

(e) Dates with exceedances on NO_x (number of exceedances on the day) were identified on 8 (9), 9 (12), 10 (6), 25 (2), 27 (4) and 28 (13) December 2020 and 1 (1), 2 (7), 3 (8), 4 (2), 13 (1), 19 (1) and 24 (1) January 2021.

(f) 2 exceedances on HCl (number of exceedances on the day) were identified on 7 January 2021.

Table 4.3 Hourly Average of Parameters Recorded for CHP 2

Parameter	Range of Hourly Average Conc. (mg/Nm³) [a] [b]	Max. Emission Limit (mg/Nm³)	Exceedance Identified	Remarks
Dust (or TSP)	0 – 2	15	Nil	Nil
Carbon Monoxide	0 – 440	650	Nil	Nil
NO_x	0 – 364	300	Identified [d]	Low biogas loading resulting in low CHP efficiency. Supplier had been arranged to fine-tune the equipment. Close monitoring of the biogas loading is performed to prevent further exceedance.

Parameter	Range of Hourly Average Conc. (mg/Nm³) [a] [b]	Max. Emission Limit (mg/Nm³)	Exceedance Identified	Remarks
SO_2	0 – 124	50	Identified [e]	Desulpurisation system tripped and was under urgent maintenance / 2 column of activated carbon filter arranged kicked in [f]; Desulpurisation under maintenance [g].
NMVOCs [b]	6.0	150	Nil	Nil
VOCs (including methane) [c]	0 – 914	1,500	Nil	Nil
HCl	0 – 4	10	Nil	Nil
HF	0 – 1.0	1	Nil	Nil

Notes:

(a) All values refer to an oxygen content in the exhaust gas of 6% and dry basis.

(b) Bi-annual sampling of NMVOCs was conducted in CHP 2 on 8 February 2021. The hourly average concentration for NMVOC was 6 mg/Nm³. No exceedance was identified. The VOCs emission limit include methane as biogas is adopted as fuel in the combustion process. The result is provided in *Annex H*.

(c) The VOCs emission limit include methane as biogas is adopted as fuel in the combustion process.

(d) Dates with exceedances on NOx (number of exceedances on the day) were identified on 1 (10), 2 (15), 3 (17), 4 (15), 5 (11), 6 (2), 7 (15), 8 (11), 11 (4), 12 (11), 13 (16), 14 (14), 15 (13), 16 (22), 17 (21), 18 (18), 19 (24), 20 (21), 21 (24), 22 (24), 23 (21), 24 (3), 25 (6), 26 (12), 27 (3), 28 (4), 29 (6), 30 (16) and 31 (13) December 2020; 1 (11), 2 (1), 3 (13), 4 (6) and 6 (2) January 2021; and 2 (1), 14 (1), 15 (3), 16 (1), 23 (8), 24 (6) and 25 (3) February 2021.

(e) Dates with exceedances on SO_2 (number of exceedances on the day) were identified on 1 (7) and 2 (2) February 2021.

Table 4.4 Hourly Average of Parameters Recorded for CHP 3

Parameter	Range of Hourly Average Conc. (mg/Nm³) [a]	Max. Emission Limit (mg/Nm³)	Exceedances Identified	Remarks
Dust (or TSP)	0 – 3	15	Nil	Nil
Carbon Monoxide	0 – 536	650	Nil	Nil
NO_x	0 – 283	300	Nil	Nil
SO_2	0 – 36	50	Nil	Nil
NMVOCs [b]	Nil	150	Nil	Nil
VOCs (including methane) [c]	0 – 1,485	1,500	Nil	Nil
HCl	0 – 2	10	Nil	Nil
HF	0 – 1.0	1	Nil	Nil

Notes:

(a) All values refer to an oxygen content in the exhaust gas of 6% and dry basis.

(b) No sampling was undertaken at CHP3 as biogas production rate could not sustain the operation of the CHP stack for the scheduled sampling on 8 February 2021.

(c) The VOCs emission limit include methane as biogas is adopted as fuel in the combustion process.

Table 4.5 Hourly Average of Parameters Recorded for ASP

Parameter	Range of Hourly Average Conc. (mg/Nm^3) [(a)]	Max. Emission Limit (mg/Nm^3)	Exceedances Identified	Remarks
Dust (or TSP)	0.0 – 0.0	5	Nil	Nil
Carbon Monoxide	0 – 450	100	Identified [(c)]	System instability due to unstable column temperature. System maintenance were performed to maintain operation efficiency
NOx	0 – 806	200	Identified [(d)]	System instability due to unstable column temperature. System maintenance were performed to maintain operation efficiency
SO_2	0 – 50	50	Nil	Nil
VOCs (including methane) [(b)]	0 – 704	20	Identified [(e)]	System instability due to unstable column temperature. System maintenance were performed to maintain operation efficiency
NH_3	0 – 154	35	Identified [(f)]	System instability due to unstable column temperature. System maintenance were performed to maintain operation efficiency
HCl	0 – 1	10	Nil	Nil
HF	0 – 1	1	Nil	Nil

Notes:

(a) All values refer to an oxygen content in the exhaust gas of 11% and dry basis.

(b) The VOCs emission limit include methane as biogas is adopted as fuel in the combustion process.

(c) Dates with exceedances on Carbon Monoxide (number of exceedances on the day) were identified on 11 (1), 12 (1), 13 (1), 21 (2) and 22 (3) January 2021.

(d) Dates with exceedances on NOx (number of exceedances on the day) were identified on 7 (4), 9 (4), 10 (4), 11 (3), 14 (1), 15 (1), 17 (1), 18 (3), 20 (2), 28 (3), 29 (3) and 30 (3) December 2020; 1 (1), 3 (1), 10 (7), 11 (3), 12 (14), 13 (16), 14 (17), 15 (21), 16 (23), 17 (17), 18 (10), 19 (14), 20 (9), 21 (6), 26 (1), 29 (3) and 31 (2) January 2021; and 2 (2), 6 (1), 10 (1), 12 (1), 15 (1) and 23 (6) February 2021.

(e) Dates with exceedances on VOC (including methane) (number of exceedances on the day) were identified on 7 (1), 14 (2), 29 (1) and 30 (1) December 2020; and 11 (1), 12 (10), 13 (7), 14 (8), 15 (3), 16 (1), 17 (4), 20 (1), 21 (2) and 22 (2) January 2021.

(f) Dates with exceedances on NH_3 (number of exceedances on the day) were identified on 10 (1), 14 (1), 29 (1) and 30 (1) December 2020; 11 (1), 12 (11), 13 (5), 14 (8), 15 (3), 16 (2), 19 (2), 20 (14), 21 (14), 22 (17), 25 (19), 26 (6), 27 (2), 28 (1) and 29 (1) January 2021; and 1 (2), 5 (1), 17 (2), 18 (4), 19 (7), 24 (11), 25 (2), 26 (1), 27 (12) and 28 (1) February 2021.

4.2 ODOUR

4.2.1 Operation Phase Monitoring

No odour patrol was required to be conducted for this reporting period.

4.3 WATER QUALITY

4.3.1 Operation Phase Monitoring

Effluent discharge was sampled monthly from the Effluent Storage Tank as stipulated in the operation phase discharge licence. The results of the discharge sample is recorded in *Table 4.6* to *4.8*.

Table 4.6 Results of the Discharge Sample Collected on 10 December 2020

Parameters	Discharged Effluent Concentration (mg/L)	Discharge Limit (mg/L)	Compliance with Discharge Limit
pH (pH units)	7.49 – 8.2	6-10 (a)	Yes
Suspended Solids	64	800	Yes
Biochemical Oxygen Demand (5 days, 20°)	18	800	Yes
Chemical Oxygen Demand	388	2,000	Yes
Oil & Grease	<5	40	Yes
Total Nitrogen	189	200	Yes
Total Phosphorus	28.0	50	Yes
Surfactants (total)	<1.0	25	Yes

Notes:
(a) Daily Average.

Table 4.7 Results of the Discharge Sample Collected on 7 January 2021

Parameters	Discharged Effluent Concentration (mg/L)	Discharge Limit (mg/L)	Compliance with Discharge Limit
pH (pH units)	7.21 – 7.95	6-10 (a)	Yes
Suspended Solids	74	800	Yes
Biochemical Oxygen Demand (5 days, 20°)	18	800	Yes
Chemical Oxygen Demand	559	2,000	Yes
Oil & Grease	<5	40	Yes
Total Nitrogen	129	200	Yes
Total Phosphorus	34.0	50	Yes
Surfactants (total)	<1.0	25	Yes

Notes:
(a) Daily Average.

Table 4.8 Results of the Discharge Sample Collected on 10 February 2021

Parameters	Discharged Effluent Concentration (mg/L)	Discharge Limit (mg/L)	Compliance with Discharge Limit
pH (pH units)	7.25 – 7.98	6-10 (a)	Yes
Suspended Solids	126	800	Yes
Biochemical Oxygen Demand (5 days, 20°)	16	800	Yes
Chemical Oxygen Demand	572	2,000	Yes
Oil & Grease	<5	40	Yes
Total Nitrogen	24.9	200	Yes

Parameters	Discharged Effluent Concentration (mg/L)	Discharge Limit (mg/L)	Compliance with Discharge Limit
Total Phosphorus	8.2	50	Yes
Surfactants (total)	<1.0	25	Yes

Notes:
(a) Daily Average.

No exceedance of discharge limit was recorded during the reporting period.

4.4 WASTE MANAGEMENT

4.4.1 Operation Phase Monitoring

Wastes generated from the operation of the Project include chemical waste, wastes generated from pre-treatment process and general refuse (1). Reference has been made to the Monthly Summary Waste Flow Table prepared by the Contractor (see *Annex E*). With reference to the relevant handling records and trip tickets of this Project, the quantities of different types of waste generated from the operation of the Project in the reporting month are summarised in *Table 4.9*.

Table 4.9 Quantities of Waste Generated from the Operation of the Project

Month / Year	Chemical Waste	Waste Generated from Pre-treatment Process		General Refuse	
	Disposal of at CWTC	Disposed of at Landfill (a)	Recycled (b)	Disposed of at Landfill (a) (d)	Recycled (c)
December 2020	766 L	685.47 tonnes	0.00 tonnes	2.88 tonnes (d)	0.00 tonnes
January 2021	1,800 L	634.00 tonnes	0.00 tonnes	2.88 tonnes (d)	0.00 tonne
February 2021	6,120 L	377.72 tonnes	0.00 tonnes	2.42 tonnes (d)	0.00 tonne

Notes:
(a) Waste generated from pre-treatment process and general refuse other than chemical waste and recyclables were disposed of at NENT landfill by sub-contractors.
(b) Among waste generated from pre-treatment process, 0.00 tonne of metals, 0.00 tonne of papers/ cardboard packing and 0.00 tonne of plastics were sent to recyclers for recycling during the reporting period.
(c) Among general refuse, 0.00 tonnes of metals, 0.00 tonnes of papers/ cardboard packing and 0 tonnes of plastics were sent to recyclers for recycling during the reporting period.
(d) It was assumed that four 240-litre bins filled with 80% of general refuse were collected at each collection. The general refuse density was assumed to be around 0.15 kg/L.

(1) Public fill and construction waste may only be generated during maintenance works when there are civil or structural works.

5 SITE AUDIT

5.1 ENVIRONMENTAL SITE AUDIT

5.1.1 Operation Phase

The monthly inspections of the landscape and visual mitigation measures for the operation phase of the Project covered the operation phase environmental site inspections. The inspections checked the implementation of the recommended mitigation measures for air quality, landscape and visual, water quality, waste (land contamination) and hazard-to-life stated in the Implementation Schedule (see *Annex D*).

Follow-up actions resulting from the site inspections were generally taken as reported by the Contractor. The Contractor has implemented environmental mitigation measures recommended in the approved EIA Report and EM&A Manual.

December 2020

The monthly inspection of the landscape and visual mitigation measures for the operation phase of the Project on 22 December 2020 covered the operation phase environmental site audit. Joint site inspections was conducted by representatives of the Contractor, ER, IEC and the MT on 22 December 2020 as required for the operation of the Project.

January 2021

The monthly inspection of the landscape and visual mitigation measures for the operation phase of the Project on 27 January 2021 covered the operation phase environmental site audit. Joint site inspections was conducted by representatives of the Contractor, ER, IEC and the MT on 27 January 2021 as required for the operation of the Project.

February *2021*

The monthly inspection of the landscape and visual mitigation measures for the operation phase of the Project on 19 February 2021 covered the operation phase environmental site audit. Joint site inspections was conducted by representatives of the Contractor, IEC and the MT on 19 February 2021 as required for the operation of the Project.

5.2 LANDSCAPE AND VISUAL AUDIT

It was confirmed that the necessary landscape and visual mitigation measures during the operation phase as summarised in *Annex D* were generally implemented by the Contractor. No non-compliance in relation to the landscape and visual mitigation measures was identified during the site audits in this reporting period and therefore no further actions are required. The ET/MT will keep track of the EM&A programme to check compliance with environmental requirements and the proper implementation of all necessary mitigation measures.

December 2020

Inspection of the landscape and visual mitigation measures for the operation phase of the Project was performed on 22 December 2020.

January 2021

Inspection of the landscape and visual mitigation measures for the operation phase of the Project was performed on 27 January 2021.

February 2021

Inspection of the landscape and visual mitigation measures for the operation phase of the Project was performed on 19 February 2021.

6 ENVIRONMENTAL NON-CONFORMANCE

6.1 SUMMARY OF ENVIRONMENTAL NON-COMPLIANCE

December 2020

Non-compliance of emission limits for CHP and ASP were recorded during the reporting period.

The Contractor has reviewed the organic waste treatment processes (i.e. waste reception, waste pre-treatment, anaerobic digesters, and composting processes) and found that they were operated normally during the reporting period. The Contractor has investigated air pollution control systems for the CHP and ASP and identified several potential causes for the exceedance. Remedial and follow-up actions had been recommended to the Contractor to perform accordingly. The Investigation Report is shown in *Annex G*.

January 2021

Non-compliance of emission limits for CHP and ASP were recorded during the reporting period.

The Contractor has reviewed the organic waste treatment processes (i.e. waste reception, waste pre-treatment, anaerobic digesters, and composting processes) and found that they were operated normally during the reporting period. The Contractor has investigated air pollution control systems for the CHP and ASP and identified several potential causes for the exceedance. Remedial and follow-up actions had been recommended to the Contractor to perform accordingly. The Investigation Report is shown in *Annex G*.

February 2021

Non-compliance of emission limits for CHP and ASP were recorded during the reporting period.

The Contractor has reviewed the organic waste treatment processes (i.e. waste reception, waste pre-treatment, anaerobic digesters, and composting processes) and found that they were operated normally during the reporting period. The Contractor has investigated air pollution control systems for the CHP and the ASP and identified several potential causes for the exceedance. Remedial and follow-up actions had been recommended to the Contractor to perform accordingly. The Investigation Report is shown in *Annex G*.

6.2 SUMMARY OF ENVIRONMENTAL COMPLAINT

No complaint was received during the reporting period.

6.3 SUMMARY OF ENVIRONMENTAL SUMMON AND SUCCESSFUL PROSECUTION

No summon/prosecution was received during the reporting period. The cumulative summons/prosecution log is shown in *Annex F*.

7 FUTURE KEY ISSUES

7.1 KEY ISSUES FOR THE COMING REPORTING PERIOD

Activities to be undertaken for the coming reporting period are:

- Operation of the Project.
- Modification of the CHP and ASP to control the air emission.

This EM&A Report presents the EM&A programme undertaken during the reporting period from **1 December 2020** to **28 February 2021** in accordance with EM&A Manual (Version F) and requirements of EP (FEP-01/395/2010/C).

For the operation phase, exceedances of the emission limits for stack monitoring (including CAPCS, CHP and ASP stacks) were recorded under normal operating conditions during the reporting period (see *Table 8.1*).

Table 8.1 Exceedances for Stack Emissions

Stack	Exceedances During the Reporting Period
Centralised Air Pollution Control Unit (CAPCS)	• Nil
Cogeneration Unit (CHP)	• Exceeded emission limit of Dust on 7 January 2021. • Exceeded emission limit of NO_x on 1 - 31 December 2020; 1, 2, 3, 4, 6, 13, 19 and 24 January 2021; and 2, 14, 15, 16, 23, 24 and 25 February 2021. • Exceeded emission limit of SO_2 on 1 and 2 February 2021 • Exceeded emission limit of HCl on 7 January 2021.
Ammonia Stripping Plant (ASP)	• Exceeded emission limit of CO on 11, 12, 13, 21 and 22 January 2021. • Exceeded emission limit of NO_x on 7, 9, 10, 11, 14, 15, 17, 18, 20, 28, 29 and 30 December 2020; 1, 3, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 26, 29 and 31 January 2021; and 2, 6, 10, 12, 15 and 23 February 2021. • Exceeded emission limit of VOC (including methane) on 7, 14, 29 and 30 December 2020; and 11, 12, 13, 14, 15, 16, 17, 20, 21 and 22 January 2021. • Exceeded emission limit of NH_3 on 10, 14, 29, 30 December 2020; 11, 12, 13, 14, 15, 16, 19, 20, 21, 22, 25, 26, 27, 28, 29 January 2021; and 1, 5, 17, 18, 19, 24, 25, 26, 27 and 28 February 2021.

Exceedances in emission parameters of CAPCS, CHP and ASP were found to be caused by system maintenance at CAPCS, low biogas loading at CHP and incomplete combustion of biogas at ASP.

The Contractor has implemented mitigation measures to control the exceedance including the maintenance and fine-tuning of equipment of the ASP, the investigation on the underlying reasons of exceedances in CAPCS, CHP and ASP and the continuous seeking of better and more feedstock to increase biogas loading and testing at ASP to optimise combustion efficiency and overall performance.

No non-compliance to the effluent discharge limit was recorded during this reporting period.

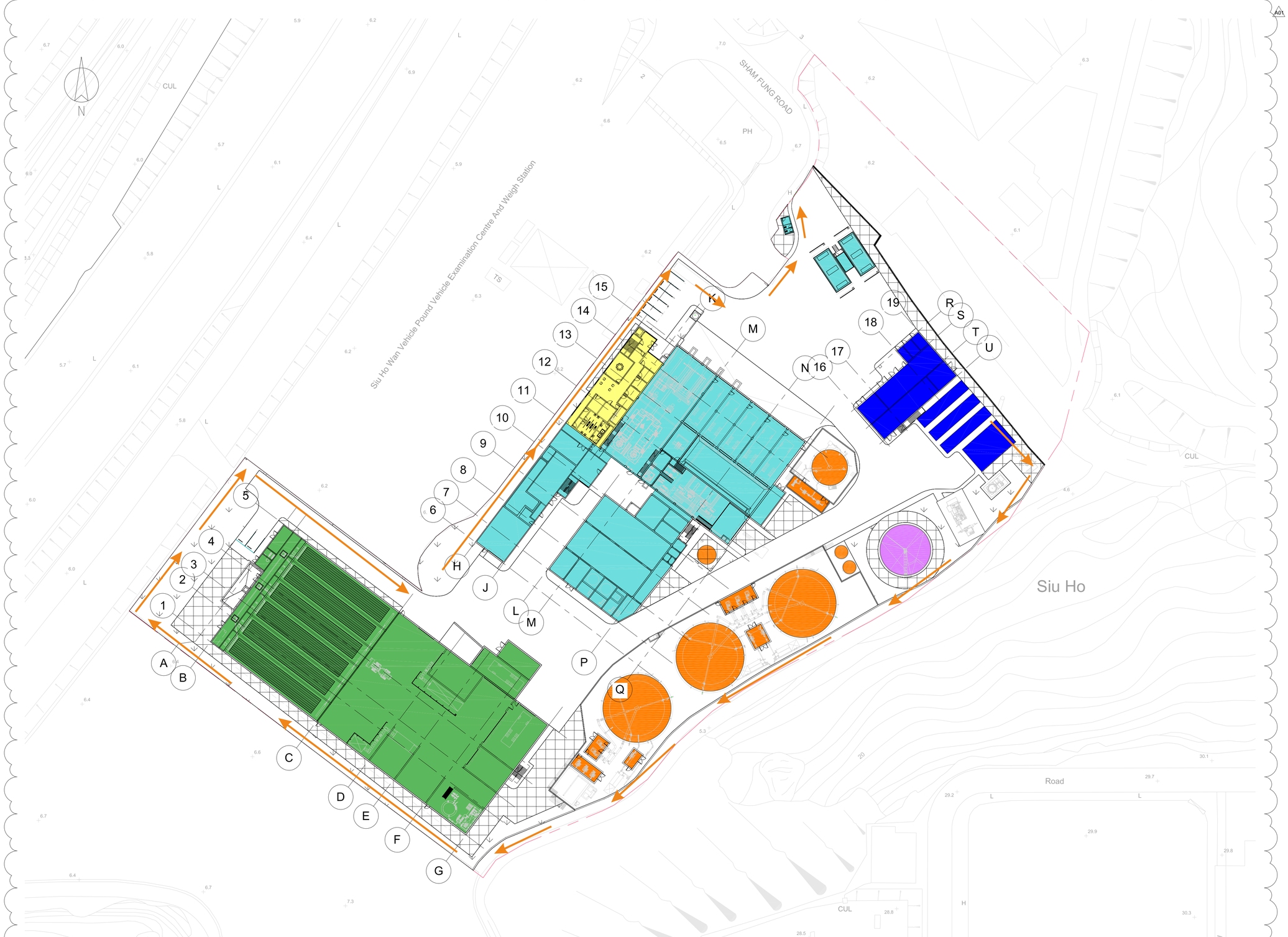
The environmental control /mitigation measures related to air quality, water quality, waste (including land contamination prevention), hazard-to-life and landscape and visual recommended in the approved EIA Report and the EM&A Manual were properly implemented by the Contractor during the reporting period.

Monthly landscape and visual monitoring were conducted in the reporting period. The necessary landscape and visual mitigation measures recommended in the approved EIA Report were generally implemented by the Contractor.

No complaint/summon/prosecution was received.

Annex A

Project Layout



Key

Patrol Route

REV	DATE	BY	APP	DESCRIPTION
A01	05/03/15	CW	MB	IMTECH BACKGROUNDS UPDATED
A00	18/02/15	CW	MB	DRAFT ISSUE

CLIENT

ENVIRONMENTAL PROTECTION DEPARTMENT
GOVERNMENT OF THE HKSAR

CLIENT'S CONSULTANT

AECOM ASIA CO. LTD.

CONTRACTOR

OSCAR BIOENERGY JV

LEAD DESIGNER

ARUP
Ove Arup & Partners Hong Kong Limited

ENVIRONMENTAL TEAM

ERM HONG KONG LIMITED

INDEPENDENT CONSULTANTS

Meinhardt Infrastructure and Environment Limited
邁進基建環保工程顧問有限公司

PROJECT

ORGANIC WASTE TREATMENT FACILITIES
PHASE 1
EP/SP/61/10

STATUS

DRAFT ISSUE

DRAWING TITLE

SITE LAYOUT

DRAWN	CHECKED	APPROVED
CW	RS	DP

SCALE	DATE
1:500@A1 / 1:1000@A3	12/02/15

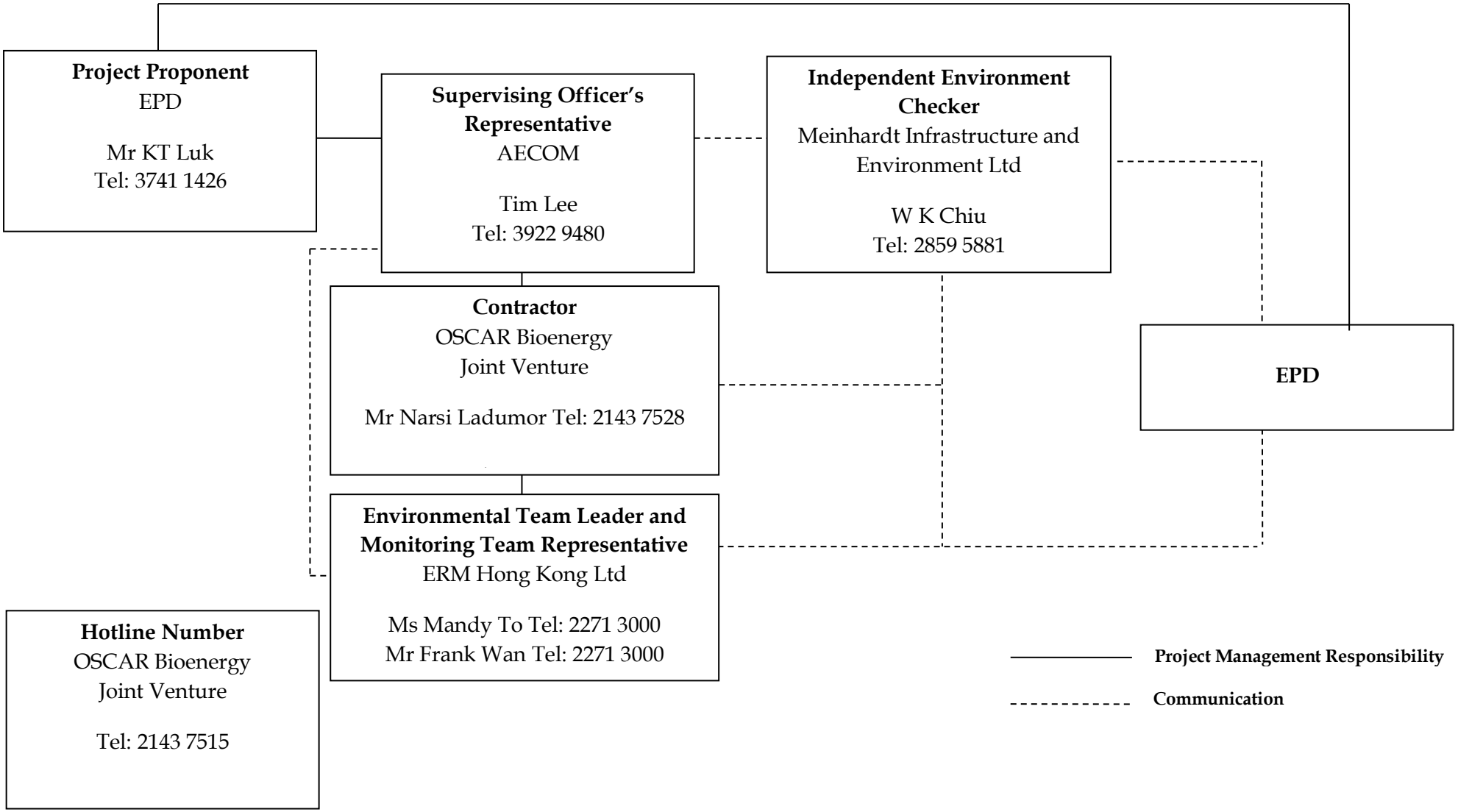
JOB NO.	DRAWING NO.	REV.
239956	DR-OAP-20-0-CA-1001	A01

0279222v.cdr

Annex B

Project Organisation Chart with Contact Details

Project Organization (with contact details)



Annex C

Calibration Certification for the On-line Stack Monitoring System

Annex C1

Calibration Certification for the CEMS

(1)

Commissioning Check List 试运行检查项目表
MCS100FT

Customer data 客户资料

Customer: OSCAR Plant: OWTF

Location: SHW

1. Device data 设备资料

Device type 设备类型: MCS100FT (1)

Serial no. 序列号: 16070493

Sample probe type 取样探头类型: SFU

2. Plant data 电厂资料

Location 标签编号: Outside 室外 ☐ Under cover 有保护罩 ☐ Inside 室内 ☑

Orientation of the stack 取样点方向: Horizontal 水平 ☐ Vertical 垂直 ☑

Orientation of sample gas probe 取样探头方向: Horizontal 水平 ☑ Vertical 垂直 ☐

Pressure 压力 1010 hpa Gas temperature 烟气温度 410 °C

Plant operating status 电厂运行情况 Normal

3. Prerequisite 系统运行条件

	Y	N	Remarks 备注
3.1. Documentation + Delivery complete 文件+货物是否齐全	☑	☐	
3.2. Platform at measurement spot has suitable dimension? 测量点平台的尺寸是否合适?	☑	☐	
3.3. If this measurement location is under legal regulation, has it been acknowledged by an official body? 如果安装位置需要符合法律法规，此安装位置是否被官方认可?	☑	☐	
3.4. Customer specific data for parameterization available? 用户对系统参数的特殊要求是否可行?	☑	☐	
3.5. Cables, tubes and sample line installed but not connected? 电缆、管线和取样管线安装但没有连接?	☑	☐	
3.6. Compressed air station installed and compressed air available? 压缩空气站已安装并且压缩空气可以使用?	☑	☐	

4. **Preliminary work** 预备工作	Y	N	Remarks 备注
4.1. Mounting of flanges like described in the Operating Instruction? 法兰安装是否按照图纸?	☑	☐	
4.2. Check for damage 检查外部损伤	☑	☐	
4.3. Check ambient conditions 检查环境条件	☑	☐	
4.4. Check mounting conditions 检查安装条件	☑	☐	
4.5. Check cables / wires for correct installation 检查电缆/电线及其连接状况	☑	☐	
4.6. Check main power supply voltage 检查总供电电压	☑	☐	

5. **Periphery** 外部设备	Y	N	Remarks 备注
5.1. Check compressed air supply 检查压缩空气供应	☑	☐	
Inlet 入口(5 bar): 6 Bar			

6. **Sample probe** 取样探头	Y	N	Remarks 备注
6.1. Connect bundle of tubes and cables 管线和电缆的连接	☑	☐	
6.2. Install probe 探头安装	☑	☐	

7. MCS100FT	Y	N	Remarks 备注
7.1. Switch on analyzer and wait for warm up 打开分析仪并等待预热	☑	☐	
7.2. Check sample conditions 检查样气情况	☑	☐	
Flow rate 流量: 230 l/h			
7.3. Check zero conditions 检查零点情况	☑	☐	
Flow rate 流量: 160 l/h			
7.4. Perform zero point setting 零点设置	☑	☐	Test results within specification.
7.5. Perform span test 量程测试	☑	☐	
7.6. Parameterize the I/O Module 设置 I/O 模块参数	☑	☐	
7.7. Measured values are plausible 测量值是否合理	☑	☐	
7.8. Save device data 储存设备数据	☑	☐	
7.9. Complete Commissioning Sign-Off Sheet 完成试运行签署表	☑	☐	
7.10. Instruct the operator personnel 操作员培训 Hand over the maintenance manual and check lists 移交维护手册和检查表 - Measurement reading 读取测量值 - Perform customer maintenance 演示维护方法 - Read messages 读取信息	☑	☐	

8. Measured value

Index 编号	Source 信号源	Unit 单位	Range 范围		Reading (actual) 实际读数	Output value 产值
			Start 开始	End 结束		
1	HCL	mg/Nm^3	0	120	60.22ppm	60.22ppm
2	HF	mg/Nm^3	0	5	4.34ppm	4.34ppm
3	CO	mg/Nm^3	0	1000	128.21ppm	128.20ppm
4	NO	mg/Nm^3	0	500	122.01ppm	122.00ppm
5	NO_2	mg/Nm^3	0	200	98.81ppm	98.80ppm
6	NO_X	mg/Nm^3	0	500	412.11 mg/m³	412.12 mg/m³
7	SO_2	mg/Nm^3	0	300	83.21ppm	83.21ppm
8	CO_2	Vol o/o	0	25	20.01 o/o	20.01 o/o
9	H_2O	Vol o/o	0	40	32.02o/o	32.01 o/o
10	O_2	Vol o/o	0	21	20.95o/o	20.95o/o
11	TOC	mg/Nm^3	0	300	122.01ppm	122.01ppm
12	NH_3	mg/Nm^3	0	100	53.30ppm	53.31ppm
13	CH_4	mg/Nm^3	0	100	112.01ppm	112.01ppm
14						
15						

Remarks 备注

Name 签名

Date
日期: 25/7/2018

Engineer
工程师:

Plant personnel
用户代表:

(2)

Commissioning Check List 试运行检查项目表
MCS100FT

Customer data 客户资料

Customer: Oscar
Plant: OWTF
Location: SHW

1. Device data 设备资料

Device type 设备类型: MCS100FT (2)
Serial no. 序列号: 1607 0494
Sample probe type 取样探头类型: SFU

2. Plant data 电厂资料

Location 标签编号	Outside 室外 ☐	Under cover 有保护罩 ☐	Inside 室内 ☑
Orientation of the stack 取样点方向	Horizontal 水平 ☐	Vertical 垂直 ☑	
Orientation of sample gas probe 取样探头方向	Horizontal 水平 ☑	Vertical 垂直 ☐	

Pressure 压力 1010 hpa
Gas temperature 烟气温度 410 °C
Plant operating status 电厂运行情况 Normal

3. Prerequisite 系统运行条件

	Y	N	Remarks 备注
3.1. Documentation + Delivery complete 文件+货物是否齐全	☑	☐	
3.2. Platform at measurement spot has suitable dimension? 测量点平台的尺寸是否合适?	☑	☐	
3.3. If this measurement location is under legal regulation, has it been acknowledged by an official body? 如果安装位置需要符合法律法规，此安装位置是否被官方认可?	☑	☐	
3.4. Customer specific data for parameterization available? 用户对系统参数的特殊要求是否可行?	☑	☐	
3.5. Cables, tubes and sample line installed but not connected? 电缆、管线和取样管线安装但没有连接?	☑	☐	
3.6. Compressed air station installed and compressed air available? 压缩空气站已安装并且压缩空气可以使用?	☑	☐	

4. **Preliminary work** 预备工作	Y	N	Remarks 备注
4.1. Mounting of flanges like described in the Operating Instruction? 法兰安装是否按照图纸?	☑	☐	
4.2. Check for damage 检查外部损伤	☑	☐	
4.3. Check ambient conditions 检查环境条件	☑	☐	
4.4. Check mounting conditions 检查安装条件	☑	☐	
4.5. Check cables / wires for correct installation 检查电缆/电线及其连接状况	☑	☐	
4.6. Check main power supply voltage 检查总供电电压	☑	☐	

5. **Periphery** 外部设备	Y	N	Remarks 备注
5.1. Check compressed air supply 检查压缩空气供应	☑	☐	
Inlet 入口(5 bar): 6 Bar			

6. **Sample probe** 取样探头	Y	N	Remarks 备注
6.1. Connect bundle of tubes and cables 管线和电缆的连接	☑	☐	
6.2. Install probe 探头安装	☑	☐	

7. MCS100FT	Y	N	Remarks 备注
7.1. Switch on analyzer and wait for warm up 打开分析仪并等待预热	☑	☐	
7.2. Check sample conditions 检查样气情况	☑	☐	
Flow rate 流量: 240 l/h			
7.3. Check zero conditions 检查零点情况	☑	☐	
Flow rate 流量: 150 l/h			
7.4. Perform zero point setting 零点设置	☑	☐	
7.5. Perform span test 量程测试	☑	☐	Test results within specification.
7.6. Parameterize the I/O Module 设置 I/O 模块参数	☑	☐	
7.7. Measured values are plausible 测量值是否合理	☑	☐	
7.8. Save device data 储存设备数据	☑	☐	
7.9. Complete Commissioning Sign-Off Sheet 完成试运行签署表	☑	☐	
7.10. Instruct the operator personnel 操作员培训 Hand over the maintenance manual and check lists 移交维护手册和检查表 - Measurement reading 读取测量值 - Perform customer maintenance 演示维护方法 - Read messages 读取信息	☑	☐	

8. Measured value

Index 编号	Source 信号源	Unit 单位	Range 范围		Reading (actual) 实际读数	Output value 产值
			Start 开始	End 结束		
1	HCL	mg/Nm^3	0	120	60.21 ppm	60.21 ppm
2	HF	mg/Nm^3	0	5	4.32 ppm	4.32 ppm
3	CO	mg/Nm^3	0	1000	128.20 ppm	128.20 ppm
4	NO	mg/Nm^3	0	500	122.00 ppm	122.00 ppm
5	NO_2	mg/Nm^3	0	200	98.80 ppm	98.81 ppm
6	NO_X	mg/Nm^3	0	500	412.22 mg/Nm^3	412.21 mg/Nm^3
7	SO_2	mg/Nm^3	0	300	83.21 ppm	83.21 ppm
8	CO_2	Vol o/o	0	25	20.00 o/o	20.00 o/o
9	H_2O	Vol o/o	0	40	32.01 o/o	32.01 o/o
10	O_2	Vol o/o	0	21	20.95 o/o	20.95 o/o
11	TOC	mg/Nm^3	0	300	122.01 ppm	122.01 ppm
12	NH_3	mg/Nm^3	0	100	53.30 ppm	53.30 ppm
13	CH_4	mg/Nm^3	0	100	112.02 ppm	112.02 ppm
14						
15						

Remarks 备注

Date 日期: 25/7/2018

Engineer 工程师: Eddie Law

Name 签名

Plant personnel 用户代表:

Cal. Date and Line# / Test Items and their ppm in Span Gas			Carbon Dioxide (CO_2)	Oxygen (O_2)	Methane (CH_4)	Carbon Monoxide (CO)	Nitric Oxide (NO)	Sulphur Dioxide (SO_2)	Nitrogen Dioxide (NO_2)	Hydrogen Chloride (HCl)	Ammonia (NH_3)	Hydrogen Floride (HF)	Propane (C_3H_8)
			20	2.1	839	128.2	122	83.2	98.8	60.2	53.3	4.31	1117
07/May/2019	L1	Before				129.81	135.82	81.84	97.86				
		After				127.93	123.07	83.37	99.1				
07/May/2019	L2	Before				126.03	118.64	82.58	97.71				
		After				129.02	122.17	83.17	98.57				
09/May/2019	L1	Before									52.15		
		After									53.17		
09/May/2019	L2	Before									51.76		
		After									54.01		
05/Jun/2019	L1	Before		2.5									
		After		2.1									
05/Jun/2019	L2	Before		2.4									
		After		2.1									
	L1	Before											
		After											
	L2	Before											
		After											
	L1	Before											
		After											
	L2	Before											
		After											
	L1	Before											
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	L2	Before											
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	L1	Before											
		After											
	L2	Before											
		After											
	L1	Before											
		After											
	L2	Before											
		After											
	L1	Before											
		After											
	L2	Before											
		After											

Annex C2

Calibration Certification for the CAPCS

QM Zertifikat / QM certificate

Dusthunter SP30

SICK
Sensor Intelligence.

Identifikation / *identification*

Artikel Nr. / *Part No.:* **1089203** **DHSP30-T2V2FPNNNNNXXS**

Ident Nr. / *Ident no.:* 00116 Serien Nr. / *Serial no.:* **18168223**

Firmware Version / *Firmware version:* 01.02.06 (Feb 27 2018 11:37:54)
Bootloader Version / *Bootloader version:* 01.00.02
Hardware Revision / *Hardware version:* 1.2
Geräteausführung / *Device version:*
BUS-Adresse / *Bus address:* 1

Parameter / *Parameter*

Sensorantwortzeit / *Sensor response time* 60.0 sec.

Gebläse / *Blower:* installiert / *installed*

Messgrößen u. Koeffizienten / *Measuring variables and coefficients*

Streulichtfaktoren / *Scattered light coefficients:*

CC0 (abs.): -0.3800
CC1 (lin.): 0.6850
CC2 (square): 0.0000

Verstärkungsfaktor, Offset / *Gain factor, Offset:*

Gain 0: 10.0000 Offset 0: 0.00045

Faktoren Analogausgang / *Analog Output factors:*

CC0 (abs.): 2.00
CC1 (lin.): 170.85
CC2 (square): 0.00

Referenzgerät Streulicht DHSP100 Serien-Nr.:
Reference measuring device DHSP100 Serial no.:

SN: 00014 / 08518553

Spantest 70 Laser / *Span 70 Laser* 70.00 %

Relais 3: Wartung / Maintenance

Koeffizientensätze Messbereich 0 / *Coefficient Sets meas. range 0:*

Koeff. Satz 1 / *Coeff. set 1:*

CC 0 (abs.): 0.0000
CC 1 (lin.): 1.0000
CC 2 (square): 0.0000

Koeff. Satz 2 / *Coeff. set 2:*

CC 0 (abs.): 0.0000
CC 1 (lin.): 1.0000
CC 2 (square): 0.0000

Messbereich, Grenzwert / *Meas. range, limit:*

Messbereichsschalter / *Meas. range switch:* 0 (Software)

Messbereich Wert1 / *Meas. range low value:* 0.0 mg

Messbereich Wert2 / *Meas. range high value:* 75.0 mg

Grenzwert / *Limit value:* 50.0 mg

Gebläse Druck/*Blower Pressure:* 10.0 mbar

Modbus Schnittstelle / *Modbus interface:*

Protokoll / *protocol:* RTU
Adresse / *address:* 1
Baudrate / *baudrate:* 19200
Datenbits Parität Stopbits / *Databits parity stopbits:* 8 EVEN 1
Endian Codierung / *endian code:* NONE

Das Gerät mit der o.g. Serien-Nr. wurde überprüft und kalibriert nach den Qualitätsstandards der SICK-Gruppe basierend auf einem nach ISO9001 zertifizierten Qualitätssicherungssystem.

This device with the serial no. noted above has been tested and calibrated according to the quality standards of the SICK-Group, which are based on a ISO9001 certified Quality Assurance System.

Ottendorf-Okrilla, 16.04.2018

Unterschrift: / *Signature:*

Annex D

Implementation Schedule of Mitigation Measures

Annex D Summary of Mitigation Measures Implementation Schedule for Operation Phase

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/ Timing	Status
Summary of Environmental Mitigation Measures in the EIA and EM&A Manual				
A. Air Quality				
3.78	2.7 & 2.13 – 2.19	*Air Pollution Control (Construction Dust) Regulation & Good Site Practices* •Commissioning tests shall be conducted to confirm the centralized air pollution control unit, the cogen units, the standby flaring unit and ASP against the design emission levels as stated in Tables 2.2 - 2.5. •Odour monitoring shall be conducted at the stack exhaust of the centralized air pollution control unit weekly in the first month of the commissioning stage.	OWTF Stacks/ During Commissioning Stage	√
3.78	2.7-2.12	*Air Pollution Control and Stack Monitoring* •Stack monitoring shall be installed for the centralized air pollution control unit, cogen units and ASP of OWTF to ensure that the air emissions from OWTF would meet the design emission limits as well as EPD criteria.	During Operation	√
3.78	2.20- 2.28	•Odour Patrol at site boundary of OWTF	OWTF Site Boundary/During Operation (The need to continue the odour patrol after the end of the 2-year monitoring period would depend on the monitoring results and should be agreed with EPD)	N/A
B. Hazard to Life				
4.103	3.4	*Operation Phase* •3m high fence should be constructed along the boundary facing the SHWWTW •Emergency evacuation procedures should be formulated and the Contractor should ensure on site staff should be familiar with these procedures. Diagram showing the escape routes to a safe place should be posted in the site notice boards and at the entrance/exit of site. A copy of the latest version emergency procedures should be dispatched to Tung Chung Fire Station for reference once available. •The emergency procedures should specify means of providing a rapid and direct warning (e.g. Siren and Flashing Light) to personnel on site in the event of chlorine gas release in the SHWWTW.	Work Site / During Operation Period	√

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/ Timing	Status
		•The Contractor should establish a communication channel with the SHWWTW operation personnel and FSD. In case of any hazardous incidents in the treatment works, operation personnel of SHWWTW should advise the Contractor to inform personnel on site to proceed with emergency procedure. The Contractor should appoint a Liaison Officer to communicate with FSD Incident Commander on site in case of emergency. •Periodic drills should be coordinated and conducted to ensure all on site personnel are familiar with the emergency procedures. Upon completion of the drills, a review on every step taken should be conducted to identify area of improvement. Prior notice of periodic drills should be given to Station Commander of Tung Chung Fire Station. Joint operational exercise with FSD and SHWWTW is recommended.		
C. Water Quality				
5.44	4.5	*Wastewater from Organic Waste Treatment Process* The Project site will be equipped with an adequately sized wastewater treatment plant. A high rate type of active sludge system specifically designed for the removal of nitrogen components from the wastewater in combination with conversion of residual BOD and COD would be deployed. The wastewater treatment plant would also be incorporated with SHARON or annamox technology or equivalent to achieve high total overall nitrogen removal. Wastewater generated from the OWTF (including wastewater from dewatering process, leachate from waste reception area, condensate from biogas handling, wastewater from scrubber of air treatment system and any surplus water from truck washing facility) will be diverted to the wastewater treatment plant. Treated effluent will then be stored temporarily in order to be used as process water within the plants. The storage volume would be around 20 m3. Overflow from the tank will be discharged to foul sewers. The polluting parameters in effluent shall be in compliance with the requirements specified in the TM- DSS. The design, installation and operation of the wastewater treatment plant shall be licensed under the Waste Disposal Ordinance and subject to the effluent monitoring as required under the WPCO which is under the ambit of regional office (RO) of EPD. To ensure that wastewater can be adequately treated and effluent from treatment plant can meet the standards listed in TM- DSS, the following mitigation measure should be conducted. • Cleaning and maintenance of treatment facilities should be conducted on a regular basis to ensure that removal rate of each treatment facility would not be reduced. • Cleaning and maintenance of pipelines should be carried out on a regular basis to prevent block of pipeline and leaching of wastewater, and therefore prevent overflowed or leached wastewater discharging into nearby drainages and water streams. • Regular site inspection should be conducted to ensure that no wastewater can be directly discharged into nearby water streams.	Work Site / During Design & Operation Period	√

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/ Timing	Status
5.55	4.5	In the scrubber, spraying water should be re-circulated to minimize the need for external water. The spraying water would be collected at the bottom of the scrubber. Excess water would be discharged to the wastewater treatment plant as described in Section 5.54.	Work Site / During Design & Operation Period	√
5.56	4.5	The waste reception, treatment facilities and compost storages of OWTF should be located in enclosed buildings to prevent generation of contaminated rain runoff. All surface runoff such as washed water generated in the treatment processes areas should be properly collected and diverted to the on-site wastewater treatment plant as described in Section 5.54.	Work Site / During Design & Operation Period	√
5.57	4.5	All drainage system for collection and transferring wastewater generated in the OWTF to the on-site wastewater treatment plant as described in Section 5.54 should be capable of preventing clogging and easy maintenance and cleaning.	Work Site / During Design & Operation Period	√
D. Waste Management				
6.50	5.12	<u>*Good Site Practices*</u> Good operational practices should be adopted to Minimize waste management impacts: •Obtain the necessary waste disposal permits from the appropriate authorities, in accordance with the Waste Disposal Ordinance (Cap. 354), Waste Disposal (Chemical Waste) (General) Regulation and the Land (Miscellaneous Provision) Ordinance (Cap. 28); •Nomination of an approved person to be responsible for good site practice, arrangements for collection and effective disposal to an appropriate facility of all wastes generated at the site; •Use of a waste haulier licensed to collect specific category of waste; •A trip-ticket system should be included as one of the contractual requirements and implemented by the Environmental Team to monitor the disposal of solid wastes at public filling facilities and landfills, and to control fly tipping. Reference should be made to ETWB TCW No. 31/2004. •Training of site personnel in proper waste management and chemical waste handling procedures; •Separation of chemical wastes for special handling and appropriate treatment at a licensed facility; •Routine cleaning and maintenance programme for drainage systems, sumps and oil interceptors; •Provision of sufficient waste disposal points and regular collection for disposal; •Adoption of appropriate measures to minimize windblown litter and dust during transportation of waste, such as covering trucks or transporting wastes in enclosed containers; and •Implementation of a recording system for the amount of wastes generated, recycled and	During Operation Period	√

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/ Timing	Status
		disposed of (including the disposal sites).		
6.51	5.13	*Waste Reduction Measures* Good management and control can prevent the generation of significant amounts of waste. It is recommended that the following good operational practices should be adopted to ensure waste reduction: •Segregation and storage of different types of waste in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal; •Encourage collection of aluminum cans, plastic bottles and packaging material (e.g. carton boxes) and office paper by individual collectors. Separate labelled bins should be provided to help segregate this waste from other general refuse generated by the work force; and •Any unused chemicals or those with remaining functional capacity should be reused as far as practicable.	During Operation Period	√
6.52	5.14	*Wastes Generated from Pre-Treatment Process* Wastes generated from pre-treatment process should be recycled as far as possible. Wastes generated from pre- treatment process should also be separated from any chemical waste and stored in covered skips. The recyclables should be collected by licensed collectors, while the rest of the waste should be removed from the site on a daily basis to minimize odour, pest and litter impacts. Open burning must be strictly prohibited.	Pre-Treatment Process/ During Operation Period	√
6.53-6.56	5.15-5.18	*Chemical Wastes* •Chemical waste generated from machinery maintenance and servicing should be managed in accordance with Code of Practice on the Packaging, Labelling and storage of Chemical Wastes under the provisions of Waste Disposal (Chemical Waste) (General) Regulation. The chemical waste should be collected by drum-type containers and removed by licensed chemical waste contractors. •Plant / equipment maintenance schedules should be planned in order to minimize the generation of chemical waste. •Non-recyclable chemical wastes and lubricants should be disposed of at appropriate facilities, such as CWTC. Copies or counterfoils from collection receipts issued by the licensed waste collector should be kept for recording purpose. •Recyclable chemical waste will be transported off-site for treatment by a licensed collector. The Contractor will need to register with EPD as a chemical waste producer. Where possible, chemical wastes (e.g. waste lubricants) would be recycled at appropriate facilities, such as Dunwell's oil re-refinery.	Whole Site / During Operation Period	√
6.57-6.58	5.19-5.20	General Refuse	Whole Site / During Operation	√

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/ Timing	Status
		•Waste generated in offices should be reduced through segregation and collection of recyclables. To promote the recycling of wastes such as used paper, aluminum cans and plastic bottles, it is recommended that recycling bins should be clearly labelled and placed at locations with easy access. For the collection of recyclable materials, they should be collected by licensed collectors. •General refuse, other than segregated recyclable wastes, should be separated from any chemical waste and stored in covered skips. The general refuse should be removed from the site on a daily basis to minimize odour, pest and litter impacts. Also, open burning of refuse must be strictly prohibited.	Period	
E. Proposed Land Contamination Preventive Measures				
6.65	5.21 (i)	<u>Fuel Oil Containers</u> •Fuel oil should be stored in suitable containers. •All fuel oil containers should be securely closed. •Appropriate labels showing the name of fuel oil should be posted on the containers. •Drip trays should be provided for all containers.	Fuel Oil Storage Containers /During Operation Period	√
6.65	5.21 (ii)	<u>Storage Area</u> •Distance between the fuel oil refuelling points and the fuel oil containers should be minimized. •The storage area should be used for fuel oil storage only. •No surface water drains or foul sewers should be connected to the storage area. •The storage area should be enclosed by three sides by a wall and have an impermeable floor or surface.	Fuel Oil Storage Area /During Operation Period	√
6.65	5.21 (iii)	<u>Fuel Oil Spillage Response</u> An Oil Spill Response Plan should be prepared by the operator to document the appropriate response procedures for oil spillage incident in detail. General procedures to be taken in case of fuel oil spillage are presented below. • <u>Training</u> Training on oil spill response actions should be given to relevant staff. The training should cover the followings: - Tools & resources to combat oil spillage and fire, e.g. locations of oil spill handling equipment and firefighting equipment; - General methods to deal with oil spillage and fire incidents; - Procedures for emergency drills in the event of oil spills and fire; and - Regular drills should be carried out. • <u>Communication</u> Establish communication channel with the Fire Services Department (FSD) and EPD to	Whole Site / During Operation Phase	√

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/ Timing	Status
		report any oil spillage incident so that necessary assistance from relevant department could be quickly sought. • <u>Response Procedure</u> Any fuel oil spillage within the Project Site should be immediately reported to the Site Manager with necessary details including location, source, possible cause and extent of the spillage Site Manager should immediately attend to the spillage and initiate any appropriate action to confine and clean up the spillage. The response procedures should include the following: - Identify and isolate the source of spillage as soon as possible. - Contain the oil spillage and avoid infiltration into soil / groundwater and discharge to storm water channels. - Remove the oil spillage. - Clean up the contaminated area. - If the oil spillage occurs during refuelling, the refuelling operation should immediately be stopped. - Recovered contaminated fuel oil and the associated material to remove the spilled oil should be considered as chemical waste. The handling and disposal procedures for chemical wastes are discussed in the following paragraphs.		
6.66	5.22 (i)	<u>Chemicals and Chemical Wastes Handling & Storage</u> • Chemicals and chemical wastes should only be stored in suitable containers in purpose-built areas. • The storage of chemical wastes should comply with the requirements of the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes. • The storage areas for chemicals and chemical wastes should have an impermeable floor or surface. The impermeable floor I surface should possess the following properties: - Not liable to chemically react with the materials and their containers to be stored. - Able to withstand normal loading and physical damage caused by container handling - The integrity and condition of the impermeable floor or surface should be inspected at regular intervals to ensure that it is satisfactorily maintained • For liquid chemicals and chemical wastes storage, the storage area should be bonded to contain at least 110% of the storage capacity of the largest containers or 20% of the total quantity of the chemicals/chemical wastes stored, whichever is the greater.	Whole Site / During Operation Period	√

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/ Timing	Status
		• Storage container should be checked at regular intervals for their structural integrity and to ensure that the caps or fill points are tightly closed. • Chemical handling should be conducted by trained workers under supervision.		
6.66	5.22 (ii)	<u>Chemicals and Chemical Wastes Spillage Response</u> A Chemicals and / or Chemical Wastes Spillage Response Plan should be prepared by the operator to document in detail the appropriate response procedures for chemicals or chemical wastes spillage incidents. General procedures to be undertaken in case of chemicals I chemical waste spillages are presented below • Training • Training on spill response actions should be given to relevant staff. The training should cover the followings: - Tools & resources to handle spillage, e.g. locations of spill handling equipment; - General methods to deal with spillage; and - Procedures for emergency drills in the event of spills. • Communication Establish communication channel with Fire Services Department (FSD) and EPD to report the spillage incident so that necessary assistance from relevant department could be quickly sought. • Response Procedures Any spillage within OWTF site should be reported to the Site Manager. Site Manager shall attend to the spillage and initiate any appropriate actions needed to confine and clean up the spillage. The response procedures should include the followings: - Identify and isolate the source of spillage as soon as possible; - Contain the spillage and avoid infiltration into soil / groundwater and discharge to storm water channels (in case the spillage occurs at locations out of the designated storage areas); - Remove the spillage; the removal method / procedures documented in the Material Safety Data Sheet (MSDS) of the chemicals spilled should be observed; - Clean up the contaminated area (in case the spillage occurs at locations out of the designated storage areas); and - The waste arising from the cleanup operation should be considered as chemical wastes.	Whole Site / During Operation Period	√
6.67 - 6.69	5.23- 5.25	<u>Incident Record</u> • After any spillage, an incident report should be prepared by the Site Manager. The incident report should contain details of the incident including the cause of the	Whole Site / During Operation Period	√

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/ Timing	Status
		incident, the material spilled and estimated spillage amount, and also the response actions undertaken. The incident record should be kept carefully and able to be retrieved when necessary. • The incident report should provide sufficient details for the evaluation of any environmental impacts due to the spillage and assessment of the effectiveness of measures taken. • In case any spillage or accidents results in significant land contamination, EPD should be informed immediately and the Project operator should be responsible for the cleanup of the affected area. The responses procedures described in Sections 6.65 - 6.66 of the EIA Report should be followed accordingly together with the land contamination assessment and remediation guidelines stipulated in the *Guidance Manual for Use of Risk-based Remediation Goals for Contaminated Land Management* and the *Guidance Note for Contaminated Land Assessment and Remediation*.		
F. Landscape and Visual				
7.98 & Table 7.8	Table 6.2	<u>Operation Phase</u> • Aesthetic design of the facade, including its colour theme, pattern, texture , materials, finishing and associated structures to harmonize with the surrounding settings • Grass / groundcover planting to soften the roof • Heavy standard tree planting to screen proposed associated structures • Grasscrete paving to soften the harshness of large paved surface areas wherever possible	Within Project Area / During Design & Operation Stages	√

Remark:
√ Compliance of Mitigation Measures
<> Compliance of Mitigation but need improvement
x Non-compliance of Mitigation Measures
▲ Non-compliance of Mitigation Measures but rectified by OSCAR Bioenergy JV
Δ Deficiency of Mitigation Measures but rectified by OSCAR Bioenergy JV
N/A Not Applicable in Reporting Period

Annex E

Waste Flow Table

No. EP/SP/61/10 of Organic Resources Recovery Centre (Phase 1)
Monthly Summary Waste Flow Table

Month	Chemical Waste	Waste Generated from Pretreatment Process				General Refuse							
		Disposed of at Landfill (see Note 1)	Metals (see Note 2)	Paper/ cardboard packaging (see Note 2)	Plastics (see Note 3)	Disposed of at Landfill (see Note 1 & 4)		Metals (see Note 2)		Paper/ cardboard packaging (see Note 2)		Plastics (see Note 3)	
	Litre	tonne	tonne	tonne	tonne	No. of collection	tonne	No. of collection	tonne	No. of collection	tonne	No. of collection	tonne
March 2019	1,200	477.08	0	0	0	26	1.50	0	0	0	0	0	0
April 2019	0	455.60	0	0	0	22	1.27	0	0	0	0	0	0
May 2019	1,000	528.22	0	0	0	25	2.88	0	0	0	0	1	0.39
June 2019	0	459.23	0	0	0	24	2.76	0	0	0	0	0	0
July 2019	0	521.79	0	0	0	26	3.00	0	0	0	0	0	0
August 2019	40	441.05	0	0	0	27	3.11	0	0	0	0	0	0
September 2019	1,800	576.28	0	0	0	24	2.76	0	0	0	0	0	0
October 2019	0	441.22	0	0	0	25	2.88	0	0	0	0	0	0
November 2019	1,600	451.57	0	0	0	26	3.00	0	0	0	0	0	0
December 2019	1,009	488.13	0	0	0	24	2.76	0	0	0	0	0	0
January 2020	0	388.20	0	0	0	23	2.65	0	0	0	0	0	0
February 2020	4,525	372.97	0	0	0	24	2.76	0	0	0	0	0	0
March 2020	1,200	351.71	0	0	0	27	3.11	0	0	0	0	0	0
April 2020	0	363.92	0	0	0	21	2.42	0	0	0	0	0	0
May 2020	800	294.36	0	0	0	25	2.88	0	0	0	0	0	0
June 2020	0	347.23	0	0	0	25	2.88	0	0	0	0	0	0
July 2020	200	852.07	0	0	0	26	3.00	0	0	0	0	0	0
August 2020	0	700.25	0	1.20	0	25	2.88	0	0	0	0	0	0
September 2020	400	579.64	0	5.31	0	26	3.00	0	0	0	0	0	0
October 2020	0	840.75	0	5.83	0	24	2.76	0	0	0	0	0	0
November 2020	0	688.20	0	0.80	0	25	2.88	0	0	0	0	0	0
December 2020	766	685.47	0	0	0	25	2.88	0	0	0	0	0	0
January 2021	1,800	634.00	0	0	0	25	2.88	0	0	0	0	0	0
February 2021	6,120	377.72	0	0	0	21	2.42	0	0	0	0	0	0

Month	Chemical Waste	Waste Generated from Pretreatment Process				General Refuse							
		Disposed of at Landfill (see Note 1)	Metals (see Note 2)	Paper/ cardboard packaging (see Note 2)	Plastics (see Note 3)	Disposed of at Landfill (see Note 1 & 4)		Metals (see Note 2)		Paper/ cardboard packaging (see Note 2)		Plastics (see Note 3)	
	Litre	tonne	tonne	tonne	tonne	No. of collection	tonne	No. of collection	tonne	No. of collection	tonne	No. of collection	tonne
Total	22,460	12,316.67	0	13.14	0	591	65.32	0	0	0	0	1	0.39

Notes:

1. General refuse was disposed of at NENT by subcontractors.
2. Metal and paper/cardboard packaging were collected by recycler for recycling.
3. Plastics refer to plastic bottles/containers, plastic sheets/foam from packaging material collected by recycler for recycling.
4. It was assumed that four 240-litre bins filled with 80% of general refuse were collected at each collection. The general refuse density was assumed to be around 0.15 kg/L.

Annex F

Environmental Complaint, Environmental Summons and Persecution Log

Annex F Cumulative Complaint and Summons/Prosecutions Log

Reporting Month	Number of Complaints in Reporting Month	Number of Summons/Prosecutions in Reporting Month
May 2015	0	0
June 2015	0	0
July 2015	0	0
August 2015	0	0
September 2015	0	0
October 2015	0	0
November 2015	0	0
December 2015	0	0
January 2016	0	0
February 2016	0	0
March 2016	0	0
April 2016	0	0
May 2016	0	0
June 2016	0	0
July 2016	0	0
August 2016	0	0
September 2016	0	0
October 2016	0	0

Reporting Month	Number of Complaints in Reporting Month	Number of Summons/Prosecutions in Reporting Month
November 2016	0	0
December 2016	0	0
January 2017	0	0
February 2017	0	0
March 2017	0	0
April 2017	0	0
May 2017	0	0
June 2017	0	0
July 2017	0	0
August 2017	0	0
September 2017	0	0
October 2017	0	0
November 2017	0	0
December 2017	0	0
January 2018	0	0
February 2018	0	0
March 2018	0	0
April 2018	0	0
May 2018	0	0
June 2018	0	0

Reporting Month	Number of Complaints in Reporting Month	Number of Summons/Prosecutions in Reporting Month
July 2018	0	0
August 2018	0	0
September 2018	1	0
October 2018	0	0
November 2018	0	0
December 2018	0	0
January 2019	0	0
February 2019	0	0
March 2019	0	0
April 2019	0	0
May 2019	0	0
June 2019	0	0
July 2019	0	0
August 2019	0	0
September 2019	0	0
October 2019	0	0
November 2019	0	0
December 2019	0	0
January 2020	0	0
February 2020	0	0

Reporting Month	Number of Complaints in Reporting Month	Number of Summons/Prosecutions in Reporting Month
March 2020	0	0
Overall Total	**1**	**0**

Annex F Cumulative Complaint and Summons/Prosecutions Log

Reporting Month	Number of Complaints in Reporting Month	Number of Summons/Prosecutions in Reporting Month
May 2015	0	0
June 2015	0	0
July 2015	0	0
August 2015	0	0
September 2015	0	0
October 2015	0	0
November 2015	0	0
December 2015	0	0
January 2016	0	0
February 2016	0	0
March 2016	0	0
April 2016	0	0
May 2016	0	0
June 2016	0	0
July 2016	0	0
August 2016	0	0
September 2016	0	0
October 2016	0	0

Reporting Month	Number of Complaints in Reporting Month	Number of Summons/Prosecutions in Reporting Month
November 2016	0	0
December 2016	0	0
January 2017	0	0
February 2017	0	0
March 2017	0	0
April 2017	0	0
May 2017	0	0
June 2017	0	0
July 2017	0	0
August 2017	0	0
September 2017	0	0
October 2017	0	0
November 2017	0	0
December 2017	0	0
January 2018	0	0
February 2018	0	0
March 2018	0	0
April 2018	0	0
May 2018	0	0
June 2018	0	0

Reporting Month	Number of Complaints in Reporting Month	Number of Summons/Prosecutions in Reporting Month
July 2018	0	0
August 2018	0	0
September 2018	1	0
October 2018	0	0
November 2018	0	0
December 2018	0	0
January 2019	0	0
February 2019	0	0
March 2019	0	0
April 2019	0	0
May 2019	0	0
June 2019	0	0
July 2019	0	0
August 2019	0	0
September 2019	0	0
October 2019	0	0
November 2019	0	0
December 2019	0	0
January 2020	0	0
February 2020	0	0

Reporting Month	Number of Complaints in Reporting Month	Number of Summons/Prosecutions in Reporting Month
March 2020	0	0
April 2020	0	0
May 2020	0	0
June 2020	0	0
July 2020	0	0
August 2020	0	0
September 2020	0	0
October 2020	0	0
November 2020	0	0
December 2020	0	0
January 2021	0	0
February 2021	0	0
Overall Total	**1**	**0**

Annex G

Investigation Reports

Annex G1

Investigation Report – December 2020

Investigation Report of CEMS Exceedances

Date	1 – 31 December 2020
Time	Continuous monitoring throughout December 2020
Monitoring Location	Continuous Environmental Monitoring System (CEMS)
Parameter	Various emission parameters of the Cogeneration Unit (CHP) and Ammonia Stripping Plan (ASP)
Exceedance Description	1. Continuous monitoring was carried out at the CAPCS, CHP and ASP throughout the reporting period using the CEMS. According to the EM&A Manual, exceedance is considered if the emission concentration of the concerned pollutants is higher than the emission limits stated in Tables 2.2, 2.3 and 2.5 of the EM&A Manual (Version F) for CAPCS, CHP and ASP respectively. The concentration of the concerned air pollutants were monitored on-line by the CEMS. Exceedances of various emission parameters were recorded on the CEMS including: • NO_x in the CHP • NO_x, VOC (including methane) and NH_3 in the ASP. 2. According to the Contractor, the plant was receiving around 100 tonnes of SSOW daily and was operated normally. 3. The Contractor explained that exceedances recorded in the CHP was due to the low biogas loading which results in the poor performance efficiency in CHP. Exceedances in ASP was caused by unstable column temperature in biogas combustion.
Action Taken / Action to be Taken	• The supplier of the CHP has conducted an on-site investigation and checking during this reporting period. The Contractor is negotiating a routine maintenance contract with the CHP supplier to allow the CHP supplier to rectify any exceedances. The Contractor is in the process of finding better and more feedstock for the system in order to increase biogas loading. • Improvement has been observed in ASP emission performance. A local site engineer was arranged to find tune and test the ASP three days a week during this reporting period. It was arranged with the supplier of ASP to check the performance of the stacks onsite. However the supplier could not travel to Hong Kong during this reporting period due to restrictive travel arrangement. Communication with supplier was maintained and fine-tuning of equipment was performed according to supplier's instructions. The Contractor is in the process to arrange for remote fine-tuning of the ASP with the overseas contractor. The

	Contractor continues to carry out maintenance measures as per the supplier's manual. The Contractor has started to establish a regular communication channel with the ASP supplier, to overcome the fact that the supplier cannot travel to Hong Kong due to travel restriction.
Remedial Works and Follow-up Actions	The Contractor is recommended to closely monitor the processes, including the modification work and follow-up emission monitoring of the CHP and ASP to avoid exceedance. MT has advised that the issue of emission exceedances should be prioritised in up-coming meetings. MT will carry out follow-up audit regarding the progress next month.

Prepared by: Bonia Leung, MT Representative
Date 11 January 2021

Annex G2

Investigation Report – January 2021

Investigation Report of CEMS Exceedances

Date	1 – 31 January 2021
Time	Continuous monitoring throughout January 2021
Monitoring Location	Continuous Environmental Monitoring System (CEMS)
Parameter	Various emission parameters of the Cogeneration Unit (CHP) and Ammonia Stripping Plan (ASP)
Exceedance Description	1. Continuous monitoring was carried out at the CAPCS, CHP and ASP throughout the reporting period using the CEMS. According to the EM&A Manual, exceedance is considered if the emission concentration of the concerned pollutants is higher than the emission limits stated in Tables 2.2, 2.3 and 2.5 of the EM&A Manual (Version F) for CAPCS, CHP and ASP respectively. The concentration of the concerned air pollutants were monitored on-line by the CEMS. Exceedances of various emission parameters were recorded on the CEMS including: • Dust, NO_x and HCl in the CHP • Carbon Monoxide, NO_x, VOC (including methane) and NH_3 in the ASP. 2. According to the Contractor, the plant was receiving around 100 tonnes of SSOW daily and was operated normally. 3. The Contractor explained that exceedances recorded in the CHP was due to the low biogas loading which results in the poor performance efficiency in CHP. Exceedances in ASP was caused by unstable column temperature in biogas combustion.
Action Taken / Action to be Taken	• Onsite adjustment was completed during this reporting period. The Contractor is negotiating a routine maintenance contract with the CHP supplier to allow the CHP supplier to rectify any exceedances. The Contractor is in the process of finding better and more feedstock for the system in order to increase biogas loading. • Improvement has been observed in ASP emission performance. A local site engineer was arranged to find tune and test the ASP three days a week during this reporting period. It was arranged with the supplier of ASP to check the performance of the stacks onsite. However the supplier could not travel to Hong Kong during this reporting period due to restrictive travel arrangement. Communication with supplier was maintained and fine-tuning of equipment was performed according to supplier's instructions. The Contractor arranged for remote fine-tuning of the ASP with the overseas contractor during this reporting

	period. The Contractor continues to carry out maintenance measures as per the supplier's manual. The Contractor has started to establish a regular communication channel with the ASP supplier, to overcome the fact that the supplier cannot travel to Hong Kong due to travel restriction.
Remedial Works and Follow-up Actions	The Contractor is recommended to closely monitor the processes, including the modification work and follow-up emission monitoring of the CHP and ASP to avoid exceedance. MT has advised that the issue of emission exceedances should be prioritised in up-coming meetings. MT will carry out follow-up audit regarding the progress next month.

Prepared by: Bonia Leung, MT Representative
Date 4 February 2021

Annex G3

Investigation Report – February 2021

Investigation Report of CEMS Exceedances

Date	1 – 28 February 2021
Time	Continuous monitoring throughout February 2021
Monitoring Location	Continuous Environmental Monitoring System (CEMS)
Parameter	Various emission parameters of the Cogeneration Unit (CHP) and Ammonia Stripping Plan (ASP)
Exceedance Description	1. Continuous monitoring was carried out at the CAPCS, CHP and ASP throughout the reporting period using the CEMS. According to the EM&A Manual, exceedance is considered if the emission concentration of the concerned pollutants is higher than the emission limits stated in Tables 2.2, 2.3 and 2.5 of the EM&A Manual (Version F) for CAPCS, CHP and ASP respectively. The concentration of the concerned air pollutants were monitored on-line by the CEMS. Exceedances of various emission parameters were recorded on the CEMS including: • NO_x and SO_2 in the CHP • NO_x and NH_3 in the ASP. 2. According to the Contractor, exceedance is observed to occur mainly at CHPs operated at loading with 40-60% of the optimal loading (1400KW) 3. The Contractor explained that exceedances recorded in the CHP was due to the low biogas loading which results in the poor performance efficiency in CHP. Exceedances in ASP was caused by unstable column temperature in biogas combustion.
Action Taken / Action to be Taken	• The Contractor will actively liaise with EPD with an aim to increase the quantity of SSOW that can be treated daily, such that sufficient biogas can be generated for the CHP to be able to operate at optimal efficiency. • The Contractor has established a regular communication channel with the overseas ASP supplier, to overcome the fact that the supplier cannot travel to Hong Kong due to travel restriction. • The Contractor arranged for remote fine-tuning of the ASP with the overseas ASP supplier during this reporting period. • Daily meetings have been held to review ASP operational and emission data. • Improvement has been observed in ASP emission performance with a reduction of no. of hours of exceedance compared with last reporting period. • The Contractor will continue to arrange for remote fine-tuning of the ASP with the overseas contractor in the upcoming reporting period. The Contractor will

	continue to carry out maintenance measures as per the supplier's manual. • The Contractor in consultation with the overseas ASP supplier will investigate the reasons for the occasional equipment tripping that has led to unstable column temperature of the thermal oxidizer. The Contractor may carry out replacement of some ASP equipment and/or increase maintenance frequency, subject to their investigations.
Remedial Works and Follow-up Actions	The Contractor is recommended to closely monitor the processes, including the modification work and follow-up emission monitoring of the CHP and ASP to avoid exceedance. MT has advised that the issue of emission exceedances should be prioritised in up-coming meetings. MT will carry out follow-up audit regarding the progress next month.

Prepared by: Angela Yung, MT Representative
Date 11 March 2021

Annex H

Laboratory Results for NMVOCs

ALS Technichem (HK) Pty Ltd
11/F, Chung Shun Knitting Centre
1-3 Wing Yip Street
Kwai Chung, N.T., Hong Kong
T +852 2610 1044 F +852 2610 2021

CERTIFICATE OF ANALYSIS

CLIENT:	Oscar Bioenergy Joint Venture	WORK ORDER:	HK2107360
CONTACT:	Mr Terence Chan		
ADDRESS:	No. 5, Sham Fung Road, Siu Ho Wan, Lantau Island, NT, Hong Kong	LABORATORY:	Hong Kong
		SUB-BATCH:	0
		DATE RECEIVED:	8th February, 2021
		DATE OF ISSUE:	24th February, 2021
PROJECT:	Stack Gas Sampling - CHP2	SAMPLE TYPE:	Air
SITE:	O·Park1, Siu Ho Wan, Lantau Island	NO. OF SAMPLES:	1
PO:	---		

COMMENTS

One (1) stack gas sample for CHP-2 was collected by ALS Technichem (HK) staff on 8th February, 2021 at the O·Park1 (Organic Resources Recovery Centre) in Lantau Island.

Sampling information (Project name, Sample ID) is provided by client.

The sample(s) was analysed and reported on 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
Managing Director - Hong Kong

1. Summary of Work

This document is the final report for the stack gas sampling and testing event for Oscar Bioenergy Joint Venture in Siu Ho Wan, North Lantau Island.

Sampling Date: 8th February 2021
Location of Stack: ORRC1, Siu Ho Wan
No. of Stack: 1
Name of Stack: CHP-2

Methods for Stack Sampling and Analysis:

Parameter	Method Reference	Sampling Time (minutes)
Volatile Organic Compounds (VOCs)[1]	US EPA Method 18	60
Non-Methane Volatile Organic Compounds (NMCOCs)[1]	US EPA Method 18	60

Note:
[1]: Results expressed as carbon

2. Sampling Summary

Volatile Organic Compounds (VOCs)

Sample gas was collected by using a stainless steel sampling probe, from the centroid of the stack, into the Tedlar bag by passive sampling technique.
The measurement of total volatile organic compounds (VOCs) content in the sample was conducted in references to BS EN 12619. VOCs content was determined by measuring the methane and non-methane volatile organic compounds of the sample by Gas Chromatograph-Flame Ionisation Detector (GC-FID).

VOCs was reported as the sum of methane and non-methane organics content in the sample.

3. Sampling Period and Stack Parameter

Test Parameter	Sampling Period
Volatile Organic Compounds (VOCs)	8 February 2021 11:00 - 12:00

Stack Parameter	Unit	Concentration
Oxygen	%	11.2

4. Result

Parameter	Unit	Reporting Limit	Result [1] [2]
Gaseous & vaporous organic substances (VOCs)	mg/m^3	0.7	847
Methane (CH_4)	mg/m^3	0.5	841
Non-Methane Organic Carbon (NMOC)	mg/m^3	0.2	6.0

Note:
[1] Results expressed as dry, at 0°C temperature, 101.325 kPa pressure and 6% O_2 content conditions.
[2] Results expressed as carbon.