

Annex G1

Investigation Report – March 2021

Investigation Report of CEMS Exceedances

Date	1 - 31 March 2021
Time	Continuous monitoring throughout March 2021
Monitoring Location	Continuous Environmental Monitoring System (CEMS)
Parameter	Various emission parameters of the Cogeneration Unit (CHP) and Ammonia Stripping Plan (ASP)
Exceedance Description	<ol style="list-style-type: none"> 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: <ul style="list-style-type: none"> • NO_x and SO₂ in the CHP • NH₃ 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 the NO_x exceedances recorded in CHP were due to the low biogas loading which results in the poor performance efficiency in CHP, the SO₂ exceedances recorded in CHP was due to tripping of the desulphurisation system, which have stopped temporary for urgent maintenance. The desulphurisation system resumed to normal operation on the day after urgent maintenance. 4. The Contractor explained that the NH₃ exceedances in ASP were caused by unstable column temperature in biogas combustion, which have led to incomplete combustion of biogas and NH₃ and hence exceedances in ASP.
Action Taken / Action to be Taken	<ul style="list-style-type: none"> • The Contractor will actively liaise with EPD in their monthly meeting 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 engaged with the CHP supplier to undertake remote fine-tuning during normal operation of the CHP, an on-site inspection was carried out by the CHP supplier representative on 12 March 2021 • The Contractor has established a regular communication channel with the overseas ASP

	<p>supplier, to overcome the fact that the supplier cannot travel to Hong Kong due to travel restriction.</p> <ul style="list-style-type: none"> • 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. • The ASP supplier is in the process of preparing a guideline for the Contractor to improve the performance of the ASP based on the data collected from January to March 2021. • Continuous improvements have been observed in ASP emission performance with a reduction of no. of hours of exceedance compared with last two reporting periods. • 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.
<p>Remedial Works and Follow-up Actions</p>	<p>The Contractor is recommended to closely monitor the processes, including the modification works 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.</p>

Prepared by: Angela Yung, MT Representative

Date: 12 April 2021

Annex G2

Investigation Report – April 2021

Investigation Report of CEMS Exceedances

Date	1 - 30 April 2021
Time	Continuous monitoring throughout April 2021
Monitoring Location	Continuous Environmental Monitoring System (CEMS)
Parameter	Various emission parameters of the Cogeneration Unit (CHP) and Ammonia Stripping Plan (ASP)
Exceedance Description	<ol style="list-style-type: none"> 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: <ul style="list-style-type: none"> • NO_x, SO₂, VOC and HCl in the CHP • NO_x, SO₂, CO and NH₃ 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 the NO_x exceedances recorded in CHP 1 and 2 were due to the low biogas loading which results in the poor performance efficiency in CHP. 4. The Contractor explained that the NO_x, VOC and HCl limits occurred due to equipment performance degrading at CHP 3. 5. The Contractor explained that the NO_x and NH₃ exceedances in ASP were caused by unstable column temperature in biogas combustion, which have led to incomplete combustion of biogas and NH₃ and hence exceedances in ASP. 6. The Contractor explained that the CO exceedances in ASP were caused by malfunctioning of the thermal destructor of the ASP, which was stopped temporary for urgent maintenance. 7. The SO₂ exceedances recorded in CHPs and ASP were due to tripping of the desulphurisation system, which were stopped temporary for urgent maintenance. The desulphurisation system resumed to normal operation on the day after urgent maintenance.
Action Taken / Action to be Taken	<ul style="list-style-type: none"> • The quantity of SSOW has increased slightly with the help of the EPD in this reporting month. The Contractor will continue to actively liaise with EPD in their monthly meeting with an aim to increase the

	<p>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.</p> <ul style="list-style-type: none"> • The Contractor has engaged with the CHP supplier to carry out an on-site inspection for the CHP by the supplier representative on 12 April 2021. The CHP supplier has subsequently prepared a protocol for the Contractor to carry out further fine-tuning. Since CHP 1 and 2 were under several modification and maintenance in the reporting month, they could not be used to completely replace CHP 3 at that time. Due to the continuous exceedance recorded in CHP 3 in late April 2021, the Contractor has decided to avoid the use of CHP 3 in May 2021 for further maintenance. Since the modification of CHP 2 has been completed in this reporting period, it will be used in place of CHP 3 in May. • 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. • 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.
<p>Remedial Works and Follow-up Actions</p>	<p>The Contractor is recommended to closely monitor the processes, including the modification works and follow-up emission monitoring of the CHP and ASP to avoid exceedance.</p> <p>MT has advised the Contractor to halt the use of CHP at an earlier stage when malfunction/unstable performance were observed to minimise further exceedance.</p> <p>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.</p>

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

Prepared by: Angela Yung, MT Representative
Date 13 May 2021

Annex G3

Investigation Report – May 2021

Investigation Report of CEMS Exceedances

Date	1 - 31 May 2021
Time	Continuous monitoring throughout May 2021
Monitoring Location	Continuous Environmental Monitoring System (CEMS)
Parameter	Various emission parameters of the Cogeneration Unit (CHP) and Ammonia Stripping Plan (ASP)
Exceedance Description	<ol style="list-style-type: none"> 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: <ul style="list-style-type: none"> • NO_x, SO₂ and VOC in the CHPs • CO, NO_x, VOC and NH₃ 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 the NO_x exceedances recorded in CHP 1 were due to the low biogas loading which results in the poor performance efficiency in CHP. 4. The Contractor explained that the VOC and NO_x exceedances recorded in the CHP 3 were due to the unstable performance of the CHP. Although the Contractor was advised to halt the use of CHP 3 in this reporting period due to its unstable performance since the last reporting period, it was used when CHP 2 was under urgent maintenance for about 10 days as sufficient biogas consumption requires the operation of 2 CHPs. 5. The Contractor explained that the CO, NO_x, VOC and NH₃ exceedances in ASP were caused by unstable column temperature in biogas combustion, which have led to incomplete combustion of biogas and NH₃ and hence exceedances in ASP. 6. The SO₂ exceedances recorded in CHPs were due to tripping of the desulphurisation system, which were stopped temporary for urgent maintenance. The desulphurisation system resumed to normal operation on the day after urgent maintenance.
Action Taken / Action to be Taken	<ul style="list-style-type: none"> • The quantity of SSOW has increased slightly with the help of the EPD in this reporting month. The Contractor will continue to actively liaise with EPD in their monthly meeting with an aim to increase the

	<p>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.</p> <ul style="list-style-type: none"> • The Contractor has engaged with the CHP supplier to carry out an on-site inspection for the CHP by the supplier representative on 26 May 2021. The Contractor will continue to avoid the use of the CHP3 in the coming months when possible. • 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. • 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.
<p>Remedial Works and Follow-up Actions</p>	<p>The Contractor is recommended to closely monitor the processes, including the modification works and follow-up emission monitoring of the CHP and ASP to avoid exceedance.</p> <p>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.</p>

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