

Annex F

## Investigation Reports

Annex F1

## Investigation Report for June 2021

**Investigation Report of CEMS Exceedances**

Date	1 – 30 June 2021
Time	Continuous monitoring throughout June 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"> <li>1. Continuous monitoring was carried out at the CAPCS, CHP and ASP throughout the reporting period using the CEMS. According to the EM&amp;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&amp;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"> <li>• NO<sub>x</sub>, SO<sub>2</sub>, VOC and HF in the CHPs</li> <li>• CO, NO<sub>x</sub> and NH<sub>3</sub> in the ASP.</li> </ul> </li> <li>2. According to the Contractor, exceedance is observed to occur mainly at CHPs operated at loading with 40-60% of the optimal loading (1400KW)</li> <li>3. The Contractor explained that the NO<sub>x</sub> exceedances recorded in CHP 1 and 2 were due to the low biogas loading which resulted in the poor performance efficiency in CHP.</li> <li>4. The Contractor explained that the NO<sub>x</sub>, VOC and HF 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 as sufficient biogas consumption requires the operation of 2 CHPs.</li> <li>5. The Contractor explained that the CO, NO<sub>x</sub>, VOC and NH<sub>3</sub> exceedances in ASP were caused by unstable column temperature in the thermal oxidiser, which have led to incomplete combustion of biogas and NH<sub>3</sub> in ASP.</li> <li>6. The SO<sub>2</sub> exceedances recorded in CHPs were due to power disruption and tripping of the desulphurisation system, which were stopped temporary for urgent maintenance. The desulphurisation system resumed to normal operation after the provision of power resumed to normal and on the day after urgent maintenance.</li> </ol>
Action Taken / Action to be Taken	<ul style="list-style-type: none"> <li>• The quantity of SSOW has increased with the help of the EPD in this reporting month, which has led to an overall drop in no. of hours of exceedance from the last</li> </ul>

	<p>reporting period (from 193 no. to 123 no. of hours). The Contractor will continue to 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.</p> <ul style="list-style-type: none"> <li>• The Contractor has engaged with the CHP supplier to carry out an on-site inspection for CHP 1 and 2 by the supplier representative on 14 June 2021. The Contractor will continue to avoid the use of the CHP3 in the coming months when possible. An inspection and overhaul of CHP3 is scheduled in July.</li> <li>• The Contractor has been fine-tuning the temperature of the thermal oxidiser to optimise its performance.</li> <li>• 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.</li> <li>• The Contractor arranged for remote fine-tuning of the ASP with the overseas ASP supplier during this reporting period.</li> <li>• Daily meetings have been held to review ASP operational and emission data.</li> <li>• 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.</li> <li>• 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 oxidiser. The Contractor may carry out replacement of some ASP equipment and/or increase maintenance frequency, subject to their investigations.</li> </ul>
<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: 14 July 2021

Annex F2

## Investigation Report for July 2021

**Investigation Report of CEMS Exceedances**

Date	1 - 31 July 2021
Time	Continuous monitoring throughout July 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"> <li>1. Continuous monitoring was carried out at the CAPCS, CHP and ASP throughout the reporting period using the CEMS. According to the EM&amp;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&amp;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"> <li>• NO<sub>x</sub>, SO<sub>2</sub> and VOCs in the CHPs</li> <li>• CO, NO<sub>x</sub>, SO<sub>2</sub>, VOCs, NH<sub>3</sub>, HCl and HF in the ASP.</li> </ul> </li> <li>2. According to the Contractor, exceedance is observed to occur mainly at CHPs operated at loading with 40-60% of the optimal loading (1400KW)</li> <li>3. The Contractor explained that the exceedances recorded in the CHPs were due to the low biogas loading which resulted in the poor performance efficiency in CHP.</li> <li>4. The Contractor explained that the exceedances in ASP were caused by unstable column condition and temperature in the thermal oxidiser, which have led to incomplete combustion of biogas and NH<sub>3</sub> in ASP.</li> </ol>
Action Taken / Action to be Taken	<ul style="list-style-type: none"> <li>• The quantity of SSOW was around 130 tonnes per day in this reporting month, which was lower than the desirable quantity. The Contractor will continue to 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.</li> <li>• The Contractor has carried out on-site inspection for the CHPs throughout mid-July 2021. The total number of hours of exceedance from CHP 1 and 2 has reduced from 47 no. to 23 no. from the last reporting period.</li> <li>• The overhaul of the CHP3 was carried out in this reporting period, this has resulted in a reduction in exceedance hour from 76 no. to 9 no. at CHP3.</li> <li>• The Contractor has been fine-tuning the conditions (air and water flow and the temperature) of the ASP</li> </ul>

	column and the temperature of the thermal oxidiser to optimise its performance.
Remedial Works and Follow-up Actions	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.

Prepared by: Angela Yung, MT Representative

Date 9 August 2021

Annex F3

## Investigation Report for August 2021



**Investigation Report of CEMS Exceedances**

Date	1 - 31 August 2021
Time	Continuous monitoring throughout August 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"> <li>1. Continuous monitoring was carried out at the CAPCS, CHP and ASP throughout the reporting period using the CEMS. According to the EM&amp;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&amp;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"> <li>• NO<sub>x</sub> and SO<sub>2</sub> in the CHPs</li> <li>• NO<sub>x</sub>, SO<sub>2</sub>, VOCs and NH<sub>3</sub> in the ASP.</li> </ul> </li> <li>2. According to the Contractor, exceedance is observed to occur mainly at CHPs operated at loading with less than half of the designed treatment capacity.</li> <li>3. The Contractor explained that the exceedances recorded in the CHPs were due to the low biogas loading which resulted in the poor performance efficiency in CHP.</li> <li>4. The Contractor explained that the exceedances recorded in the CHP1 was due to its unstable performance.</li> <li>5. The Contractor explained that the exceedances in ASP were caused by unstable column condition and temperature in the thermal oxidiser, which have led to incomplete combustion of biogas and NH<sub>3</sub> in ASP.</li> <li>6. The Contractor explained that the SO<sub>2</sub> exceedances in the CHPs and the ASP occurred due to equipment tripping of the air blower of the desulphurisation system.</li> </ol>
Action Taken / Action to be Taken	<ul style="list-style-type: none"> <li>• The quantity of SSOW was around 93 tonnes per day in this reporting month, which was lower than the desirable quantity. The Contractor will continue to 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.</li> <li>• The use of CHP 1 was discontinued from 21 August and the Contractor carried out on-site inspection for CHP 1 in late August.</li> <li>• The Contractor has been fine-tuning the conditions (air and water flow and the temperature) of the ASP</li> </ul>

	<p>column and the temperature of the thermal oxidiser to optimise its performance.</p> <ul style="list-style-type: none"> <li>• The de-sulphurisation system was stopped temporarily and has resumed to normal operation after urgent maintenance. An additional filter was put in place to lower the emission from the CHPs. Also, the Contractor is arranging inspection by the supplier of the CHPs to investigate the cause of tripping.</li> </ul>
<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>As similar issues have been re-occurred for sometimes, the Contractor is advised to undertake a comprehensive review of the operation of the concerned systems and the effectiveness of the existing mitigation measures and proposed further measures to avoid the exceedance.</p>

Prepared by: Angela Yung, MT Representative

Date 13 September 2021