

Annex F

## Investigation Report

Annex F1

## Investigation Report for March 2022

**Investigation Report of CEMS Exceedances**

Date	1 – 31 March 2022
Time	Continuous monitoring throughout March 2022
Monitoring Location	Continuous Environmental Monitoring System (CEMS)
Parameter	Various emission parameters of the Cogeneration Units (CHP) and the Ammonia Stripping Plant (ASP)
Exceedance Description	<p>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:</p> <ul style="list-style-type: none"> <li>• SO<sub>2</sub> in CHP 1</li> <li>• CO, NO<sub>x</sub>, VOCs and NH<sub>3</sub> in the ASP</li> </ul> <p>2. The Contractor has investigated the cause of the exceedance and identified that</p> <ul style="list-style-type: none"> <li>• The exceedances of SO<sub>2</sub> from CHP 1 occurred due to tripping of a blower in the de-sulphurisation system.</li> <li>• The exceedances from ASP occurred due to system instability caused by leakage of tubing within the economiser of the ASP.</li> </ul>
Action Taken / Action to be Taken	The Contractor arranged immediate maintenance work after the malfunctioning of internal instruments of the de-sulphurisation system and the ASP were identified.
Remedial Works and Follow-up Actions	<p>The ASP is under optimisation by the Contractor.</p> <p>The Contractor is recommended to closely monitor the processes, including the modification works and follow-up emission monitoring of the ASP to avoid exceedance.</p> <p>The Contractor should review the routine inspection and maintenance schedule of the ASP and conduct preventative maintenance to avoid similar re-occurrence of the equipment failure.</p>

Prepared by: Angela Yung, MT Representative

Date: 15 April 2022

Annex F2

## Investigation Report for April 2022

**Investigation Report of CEMS Exceedances**

Date	1 - 30 April 2022
Time	Continuous monitoring throughout April 2022
Monitoring Location	Continuous Environmental Monitoring System (CEMS)
Parameter	Various emission parameters of the Cogeneration Units (CHP) and the Ammonia Stripping Plant (ASP)
Exceedance Description	<p>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:</p> <ul style="list-style-type: none"> <li>• SO<sub>2</sub> in CHP 1 and 2</li> <li>• NO<sub>x</sub> in CHP 3</li> <li>• CO, NO<sub>x</sub>, SO<sub>2</sub>, VOCs and NH<sub>3</sub> in the ASP</li> </ul> <p>2. The Contractor has investigated the cause of the exceedance and identified that</p> <ul style="list-style-type: none"> <li>• The exceedances of SO<sub>2</sub> from CHP 1, 2 and ASP occurred due to tripping of a blower in the de-sulphurisation system, affecting air supply to the system.</li> <li>• The exceedances of NO<sub>x</sub> occurred due to unstable system caused by leakage within the CHP 3.</li> <li>• Other exceedances from ASP occurred due to system instability caused by motor overheating, unstable water flow and leakage of the ASP feed pump.</li> </ul>
Action Taken / Action to be Taken	<p>For the SO<sub>2</sub> exceedance, the Contractor arranged immediate maintenance work for the air blower and cleaned its filter when the issue was identified. The air blower was fixed on the same day.</p> <p>For the NO<sub>x</sub> exceedance, the Contractor has temporarily fixed the leakage upon identification of the cause of exceedances. The Contractor will continue to monitor the situation.</p> <p>For the other exceedances from the ASP, the Contractor has reinstalled the ASP feed pump on 29 March 2022 but were unable to completely resolve the leakage. The Contractor is pending the required parts for maintenance.</p>
Remedial Works and Follow-up Actions	<p>The Contractor will continue to monitor the leakage within CHP3 and will resolve the leakage in the ASP as soon as the parts required for maintenance are available.</p> <p>The Contractor is recommended to closely monitor the processes, including the modification works and follow-up emission monitoring of the ASP to avoid exceedance.</p>

	The Contractor should review the routine inspection and maintenance schedule of the ASP and conduct preventative maintenance to avoid similar re-occurrence of the equipment failure.
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Prepared by: Angela Yung, MT Representative

Date 14 May 2022

Annex F3

## Investigation Report for May 2022

**Investigation Report of CEMS Exceedances**

Date	1 - 31 May 2022
Time	Continuous monitoring throughout May 2022
Monitoring Location	Continuous Environmental Monitoring System (CEMS)
Parameter	Various emission parameters of the Cogeneration Units (CHP) and the Ammonia Stripping Plant (ASP)
Exceedance Description	<p>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:</p> <ul style="list-style-type: none"> <li>• SO<sub>2</sub> in CHPs and ASP</li> <li>• NO<sub>x</sub> in CHP 3</li> <li>• CO, NO<sub>x</sub>, SO<sub>2</sub>, VOCs, NH<sub>3</sub> and HF in the ASP</li> </ul> <p>2. The Contractor has investigated the cause of the exceedance and identified that</p> <ul style="list-style-type: none"> <li>• The exceedances of SO<sub>2</sub> from CHPs and the ASP occurred due to failure of a column in the de-sulphurisation system caused by the cleaning activities of the columns.</li> <li>• The exceedances of NO<sub>x</sub> from CHP 3 in early May 2022 occurred due to insufficient feedstock.</li> <li>• Other exceedances from ASP occurred due to system instability caused by the ongoing performance optimisation of the ASP. The change of other system parameters has lowered the temperature of the thermal unit of the ASP and resulted in the incomplete combustion of biogas.</li> </ul>
Action Taken / Action to be Taken	<p>For the SO<sub>2</sub> exceedance, the Contractor inspected the column and the pipes and pumps of the systems when exceedance and malfunctioning of the system were observed. Isolation of the affected system and maintenance of the columns were carried out. The performance of the system resumed to normal in late-May 2022.</p> <p>For the other exceedances from the ASP, the Contractor will continue to carry out maintenance and optimisation measures to restore the combustion efficiency so that the concerned pollutants will be effectively destroyed.</p>
Remedial Works and Follow-up Actions	The Contractor will replace the activated carbon filter in the de-sulphurisation system in the coming reporting period to improve the SO <sub>2</sub> removal efficiency.



	<p>The Contractor is recommended to closely monitor the processes, including the modification works and follow-up emission monitoring of the ASP to avoid exceedance.</p> <p>The Contractor should review the routine inspection and maintenance schedule of the ASP and conduct preventative maintenance to avoid similar re-occurrence of the equipment failure.</p>
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Prepared by: Angela Yung, MT Representative

Date 14 June 2022