

Annex F

## Investigation Report

Annex F1

## Investigation Result for June 2022

**Investigation Report of CEMS Exceedances**

Date	1 - 30 June 2022
Time	Continuous monitoring throughout June 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>• NO<sub>x</sub> and SO<sub>2</sub> from the CHPs</li> <li>• CO, NO<sub>x</sub>, SO<sub>2</sub>, and NH<sub>3</sub> from 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 the CHPs occurred due to tripping of the de-sulphurisation system resulted from the residue of sulphur accumulated at the exhaust heat exchangers.</li> <li>• The exceedances of NO<sub>x</sub> from CHPs occurred due to system instability caused by prolonged usage of the CHPs.</li> <li>• The exceedance of CO, NO<sub>x</sub>, SO<sub>2</sub> and NH<sub>3</sub> from ASP occurred due to system instability caused by ASP column and heat exchanger deteriorated condition.</li> </ul>
Action Taken / Action to be Taken	<p>The Contractor has arranged cleaning of the heat exchangers of all CHPs to remove potential sulphur residue from the exhaust gas system. The Contractor has also replaced all catalytic convertors with an aim to improve the CO removal efficiency of the system.</p> <p>The Contractor has arranged cleaning of the ASP column and heat exchanger to resume performance.</p> <p>A planned overhaul of CHP 2 is arranged in the next reporting period and is expected to complete in August 2022.</p>
Remedial Works and Follow-up Actions	<p>The Contractor has arranged a specialist to review the CEMS system performance and accuracy. The specialist will carry out in-depth investigation and propose any remediation needed.</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>
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Prepared by: Angela Yung, MT Representative

Date 29 June 2022

Annex F2

## Investigation Result for July 2022

**Investigation Report of CEMS Exceedances**


Date	1 - 31 July 2022
Time	Continuous monitoring throughout July 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>• NO<sub>x</sub> and SO<sub>2</sub> from the CHPs</li> <li>• NO<sub>x</sub>, SO<sub>2</sub>, and NH<sub>3</sub> from 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 the CHPs occurred due to tripping of the de-sulphurisation system resulted from the residue of sulphur accumulated at the exhaust heat exchangers.</li> <li>• The exceedances of NO<sub>x</sub> from CHPs occurred due to system instability caused by prolonged usage of the CHPs.</li> <li>• The exceedance of NO<sub>x</sub>, SO<sub>2</sub> and NH<sub>3</sub> from ASP occurred due to system instability caused by ASP column and heat exchanger deteriorated condition.</li> </ul>
Action Taken / Action to be Taken	<p>The Contractor has arranged cleaning of the heat exchangers of all CHPs to remove potential sulphur residue from the exhaust gas system and replaced all catalytic convertors with an aim to improve the CO removal efficiency of the system.</p> <p>The Contractor has also arranged cleaning of the ASP heat exchanger to optimise its performance. A planned overhaul of CHP 2 is expected to complete in the next reporting period.</p>
Remedial Works and Follow-up Actions	<p>The Contractor has arranged a specialist to review the CEMS system performance and accuracy since last reporting period. The specialist will formulate plan(s) to improve the accuracy of the SICK system.</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 8 August 2022

**Investigation Report of Odour Exceedances**

Date	6 July 2022
Time	10:42 am
Monitoring Location	Location 7 (at the car park outside the Visitor Centre) 
Parameter	Odour Intensity
Exceedance Description	<ol style="list-style-type: none"> <li>1. According to the EM&amp;A Manual, exceedance is considered if Odour Intensity recorded at the odour patrol is Level 2 or above. During the odour patrol on 6 July 2022 morning, the odour patrol panellists identified the scent of garbage with Odour Intensity of 2 at location 7 (refer to Annex G for location detail). An Odour Intensity lower than 2 was later recorded at the same monitoring location in the afternoon of the same day.</li> <li>2. An investigation was carried out by the Contractor and the source of the odour was a mixture of the scents of garbage and the de-odorising agent used for the Suspension Buffer Tank (SBT) cleaning undertaken during the odour patrol <sup>(1)</sup>.</li> </ol>
Action Taken / Action to be Taken	Another round of odour patrol was carried out on 19 July 2022, the Odour Intensity recorded from this odour patrol was under 2 (refer to Annex G for the result of both rounds of odour patrol).
Remedial Works and Follow-up Actions	The Contractor is currently exploring alternative de-odorising agent(s) to minimise the odour impact.

Prepared by: Angela Yung (MT representative)

Date: 9 August 2022

(1) SBT cleaning was carried out from 30 June to 19 July 2022.



Annex F3

## Investigation Result for August 2022

**Investigation Report of CEMS Exceedances**

Date	1 - 31 August 2022
Time	Continuous monitoring throughout August 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>• NO<sub>x</sub> and SO<sub>2</sub> from the CHPs</li> <li>• NO<sub>x</sub> and NH<sub>3</sub> from 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 the CHPs occurred due to tripping of the de-sulphurisation system resulted from the residue of sulphur accumulated at the exhaust heat exchangers.</li> <li>• The exceedances of NO<sub>x</sub> from CHPs occurred due to system instability caused by prolonged usage of the CHPs.</li> <li>• The exceedance of NO<sub>x</sub> and NH<sub>3</sub> from ASP occurred due to system instability caused by ASP column and heat exchanger deteriorated condition.</li> </ul>
Action Taken / Action to be Taken	<p>The Contractor has arranged cleaning of the heat exchangers of all CHPs to remove potential sulphur residue from the exhaust gas system. The Contractor has also replaced all catalytic converters with an aim to improve the CO removal efficiency of the system.</p> <p>The Contractor has arranged cleaning of the ASP column and heat exchanger to resume performance.</p> <p>A planned overhaul of CHP 2 is arranged in the next reporting period and is expected to complete by mid-September 2022.</p>
Remedial Works and Follow-up Actions	<p>The Contractor has arranged a specialist to review the CEMS system performance and accuracy. The specialist will carry out in-depth investigation and propose any remediation needed.</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>
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Prepared by: Chris Ng, MT Representative

Date 13 September 2022