

Annex F

## Investigation Reports

Annex F-1

## Investigation Report for June 2023

**Investigation Report of CEMS Exceedances**

Date	1 - 30 June 2023
Time	Continuous monitoring throughout June 2023
Monitoring Location	Continuous Environmental Monitoring System (CEMS)
Parameter	Various emission parameters of the Cogeneration Units (CHPs) and 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 CHP1;</li> <li>• NO<sub>x</sub> and SO<sub>2</sub> from the CHP2;</li> <li>• NO<sub>x</sub> and SO<sub>2</sub> from the CHP3; and</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 exceedances and identified that:</p> <ul style="list-style-type: none"> <li>• The exceedances of NO<sub>x</sub> and SO<sub>2</sub> from CHPs, and the exceedances of NO<sub>x</sub>, SO<sub>2</sub> and NH<sub>3</sub> from ASP occurred due to system instability.</li> </ul>
Action Taken / Action to be Taken	The Contractor investigated the reason for the exceedances and arranged Remedial Works and Follow-up Actions (see below).
Remedial Works and Follow-up Actions	The Contractor has arranged the CHP supplier to inspect, analyse and improve CHP performance in July 2023. Improvement recommendation will be provided once the report is completed. The Contractor has also arranged cleaning and repairing of the ASP in July 2023 to restore the treatment efficiency of the ASP.

Prepared by: Alex Khawaja Waheed, MT Representative

Date: 28 November 2023

**Investigation Report of Discharged Sample Exceedances**

Date	9 June 2023
Monitoring Location	Outlet Chamber of the Effluent Storage Tank
Parameter	Total Nitrogen, Total Phosphorus
Exceedance Description	<ol style="list-style-type: none"> <li>1. According to EM&amp;A Manual, the monitoring of the effluent discharge from the outlet chamber of the Effluent Storage Tank and Petrol Interceptors shall be carried out monthly and bi-monthly, respectively, under Section 21 of the Water Pollution Control Ordinance (WPCO) license. Exceedance is considered if the concentration of discharged effluent sample from the Effluent Storage Tank and Interceptors is higher than the discharge limits stated in Part B2 of the WPCO. Exceedances of discharge parameter was recorded during the monitoring of effluent discharge from the outlet chamber of the Effluent Storage Tank.</li> <li>2. The Contractor has investigated the cause of the exceedances and found that the exceedance of Total Nitrogen and Total Phosphorus from the effluent discharge from the outlet chamber of Effluent Storage Tank was potentially caused by SBR condition had not stabilized after previous cleaning event.</li> </ol>
Action Taken / Action to be Taken	The Contractor investigated the reason for the exceedance. New effluent sample has been taken on 11 July 2023.
Remedial Works and Follow-up Actions	The Contractors has arranged action to increase bacteria activities. Increasing activated sludge volume and extended continuous aeration is ongoing to assess the effectiveness.

Prepared by: Benny Lam, MT Representative

Date 13 July 2023

Annex F-2

## Investigation Report for July 2023

**Investigation Report of CEMS Exceedances**

Date	1 - 31 July 2023
Time	Continuous monitoring throughout July 2023
Monitoring Location	Continuous Environmental Monitoring System (CEMS)
Parameter	Various emission parameters of the Cogeneration Units (CHPs) and 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, CHPs and ASP respectively. The concentrations 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 CHP1;</li> <li>• NO<sub>x</sub> and SO<sub>2</sub> from the CHP2;</li> <li>• NO<sub>x</sub>, SO<sub>2</sub> and HCl from the CHP3; and</li> <li>• NO<sub>x</sub>, SO<sub>2</sub>, NH<sub>3</sub>, and HCl 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 NO<sub>x</sub> and SO<sub>2</sub> from the CHPs, HCl from CHP3 and the exceedances of NO<sub>x</sub>, SO<sub>2</sub>, NH<sub>3</sub>, and HCl from ASP occurred due to system instability.</li> </ul>
Action Taken / Action to be Taken	The Contractor investigated the reason for the exceedances and arranged Remedial Works and Follow-up Actions (see below).
Remedial Works and Follow-up Actions	<ul style="list-style-type: none"> <li>• The Contractor has arranged the CHP supplier to inspect, analyse and improve CHP performance in Aug 2023 based on final reports of the quality assurance level 2 test (QAL) for the CEMS calibration. Improvement recommendation will be provided once the report is received.</li> <li>• The Contractor has also arranged cleaning of the ASP in August 2023 to restore the treatment efficiency of the ASP.</li> </ul>

Prepared by: Benny Lam, MT Representative

Date: 8 Aug 2023

**Investigation Report of Discharged Sample Exceedances**

Date	31 July 2023
Monitoring Location	Outlet Chamber of the Effluent Storage Tank
Parameter	Total Nitrogen, Total Phosphorus
Exceedance Description	<ol style="list-style-type: none"> <li>1. According to EM&amp;A Manual, the monitoring of the effluent discharge from the outlet chamber of the Effluent Storage Tank and Petrol Interceptors shall be carried out monthly and bi-monthly, respectively, under Section 21 of the Water Pollution Control Ordinance (WPCO) license. Exceedance is considered if the concentration of discharged effluent sample from the Effluent Storage Tank and Interceptors is higher than the discharge limits stated in Part B2 of the WPCO. Exceedances of discharge parameter was recorded during the monitoring of effluent discharge from the outlet chamber of the Effluent Storage Tank.</li> <li>2. The Contractor has investigated the cause of the exceedances and found that the exceedances of Total Nitrogen and Total Phosphorus were due to fresh seeding sludge injection to the SBR system in mid-July 2023, bacterial activities of second stage treatment for the complete removal cycle was lagging behind which result in incomplete bacterial reaction of the effluent.</li> </ol>
Action Taken / Action to be Taken	The Contractor investigated the reason for the exceedance.
Remedial Works and Follow-up Actions	The Contractors has arranged action to increase bacteria activities. Increasing activated sludge volume and extended continuous aeration is ongoing to assess the effectiveness.

Prepared by: Benny Lam, MT Representative

Date: 8 Aug 2023

Annex F-3

## Investigation Report for August 2023



**Investigation Report of CEMS Exceedances**

Date	1 - 31 August 2023
Time	Continuous monitoring throughout August 2023
Monitoring Location	Continuous Environmental Monitoring System (CEMS)
Parameter	Various emission parameters of the Centralised Air Pollution Control Unit (CAPCS), Cogeneration Units (CHPs) and 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, CHPs and ASP respectively. The concentrations 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>• Total Odour (NH<sub>3</sub> and H<sub>2</sub>S) from the CAPCS;</li> <li>• NO<sub>x</sub> and SO<sub>2</sub> from the CHP1;</li> <li>• NO<sub>x</sub>, SO<sub>2</sub>, and HCl from the CHP2;</li> <li>• NO<sub>x</sub>, SO<sub>2</sub> from the CHP3; and</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 NO<sub>x</sub>, SO<sub>2</sub>, and HCl from the CHPs, as well as the exceedances of NO<sub>x</sub>, SO<sub>2</sub> and NH<sub>3</sub> from ASP occurred due to system instability.</li> <li>• The exceedances of Total Odour (NH<sub>3</sub> and H<sub>2</sub>S) from the CAPCS were caused by the filter being blocked and the sensor head being clogged with moisture.</li> </ul>
Action Taken / Action to be Taken	The Contractor investigated the reason for the exceedances and arranged Remedial Works and Follow-up Actions (see below).
Remedial Works and Follow-up Actions	<ul style="list-style-type: none"> <li>• The Contractor has arranged the CHP supplier to inspect, analyse and improve CHP performance in September 2023 based on final reports of the quality assurance level 2 test (QAL) for the CEMS calibration. Improvement recommendation will be provided once the report is received.</li> <li>• The Contractor has also arranged cleaning of the ASP in September 2023 to restore the treatment efficiency of the ASP.</li> <li>• Finally, the Contractor has arranged for the calibration of the NH<sub>3</sub> and H<sub>2</sub>S sensors of the CAPCS in September 2023.</li> </ul>

Prepared by: Alex Khawaja Waheed, MT Representative  
 Date: 11 September 2023