

Annex F1

Investigation Result for December 2022

Investigation Report of CEMS Exceedances

Date	1 – 31 December 2022
Time	Continuous monitoring throughout December 2022
Monitoring Location	Continuous Environmental Monitoring System (CEMS)
Parameter	Various emission parameters of the Cogeneration Units (CHP)
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&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:</p> <ul style="list-style-type: none"> • NO_x and SO₂, from the CHPs; and • HCl from the CHP2; and • NO_x, SO₂ and NH₃ from ASP; and • CO, NO_x, SO₂, VOCs, HCl and HF from Standby Flaring Gas Unit <p>2. The Contractor has investigated the cause of the exceedance and identified that</p> <ul style="list-style-type: none"> • The exceedances of SO₂ from the CHPs and ASP occurred due to tripping of the de-sulphurisation system resulted from the residue of sulphur accumulated at the exhaust heat exchangers. • The exceedances of NO_x and NH₃ from CHPs and ASP occurred due to system instability caused by prolonged usage of the CHPs. • The exceedance of HCl from CHP 2 occurred due to system instability caused by CHP 2 column and heat exchanger deteriorated condition. • The exceedances of CO, NO_x, SO₂, VOCs, HCl and HF from Standby Flaring Gas Unit occurred due to the biogas bypass trial.
Action Taken / Action to be Taken	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.
Remedial Works and Follow-up Actions	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.

Prepared by: Chris Ng, MT Representative

Date: 5 May 2023

Annex F2

Investigation Result for January 2023

Investigation Report of CEMS Exceedances

Date	1 – 31 January 2023
Time	Continuous monitoring throughout January 2023
Monitoring Location	Continuous Environmental Monitoring System (CEMS)
Parameter	Various emission parameters of the Cogeneration Units (CHPs) , Ammonia Stripping Plant (ASP), and Standby Flaring Gas Unit
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&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:</p> <ul style="list-style-type: none"> • NO_x and SO₂, from the CHPs; and • NO_x, SO₂ and NH₃ from ASP; and • CO, VOCs, HCl and HF from Standby flaring Gas Unit <p>2. The Contractor has investigated the cause of the exceedance and identified that</p> <ul style="list-style-type: none"> • The exceedances of SO₂ from the CHPs and ASP occurred due to tripping of the de-sulphurisation system resulted from the residue of sulphur accumulated at the exhaust heat exchangers. • The exceedances of NO_x and NH₃ from CHPs and ASP occurred due to system instability caused by prolonged usage of the CHPs and the ongoing performance optimisation of the ASP, resulting in a lowered temperature of the system and the incomplete combustion of biogas. • The exceedances of CO, VOCs, HCl and HF from Standby Flaring Gas Unit occurred due to biogas bypass trial.
Action Taken / Action to be Taken	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.
Remedial Works and Follow-up Actions	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.

Prepared by: Chris Ng, MT Representative
Date: 5 March 2023

Annex F3

Investigation Result for February 2023

Investigation Report of CEMS Exceedances

Date	1 – 28 February 2023
Time	Continuous monitoring throughout February 2023
Monitoring Location	Continuous Environmental Monitoring System (CEMS)
Parameter	Various emission parameters of the Cogeneration Units (CHP)
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&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:</p> <ul style="list-style-type: none"> • NO_x, SO₂ and HCl from the CHPs; and • NO_x, SO₂ and NH₃ from ASP <p>2. The Contractor has investigated the cause of the exceedance and identified that</p> <ul style="list-style-type: none"> • The exceedances of SO₂ from the CHPs and ASP occurred due to tripping of the de-sulphurisation system resulted from the residue of sulphur accumulated at the exhaust heat exchangers. • The exceedances of NO_x, HCl and NH₃ from CHPs and ASP occurred due to system instability caused by prolonged usage of the CHPs.
Action Taken / Action to be Taken	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.
Remedial Works and Follow-up Actions	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.

Prepared by: Chris Ng, MT Representative

Date: 3 April 2023

Investigation Report of Discharged Effluent Exceedances

Date	23 February 2023
Time	The monitoring of Petrol Interceptors (1 and 2)
Monitoring Location	The Petrol Interceptors 1 and 2
Parameter	Suspended Solids and Chemical Oxygen Demand
Exceedance Description	<p>1. According to EM&A Manual, the monitoring of the Petrol Interceptors (1 and 2) shall be carried out bi-monthly under Section 21 of the Water Pollution Control Ordinance (WPCO) license. Exceedance is considered if the concentration of discharged effluent sample from the Interceptors is higher than the discharge limits stated in Part B1 of the WPCO. Exceedances of various discharge parameters were recorded on the monitoring of Petrol Interceptors (1 & 2) including:</p> <ul style="list-style-type: none"> • Suspended Solids and Chemical Oxygen Demand from Petrol Interceptor 1 • Chemical Oxygen Demand from Petrol Interceptor 2 <p>2. The Contractor has investigated the cause of the exceedance and suspected that</p> <ul style="list-style-type: none"> • The exceedances of the mentioned parameters from Petrol Interceptors 1 and 2 occurred due to the dry season with less rainfall season, resulting in the discharge water containing higher concentrations for the exceeded parameters.
Action Taken / Action to be Taken	The Contractor investigated the reason for the exceedance. It was suspected that the reason for the exceedances of the parameters was due to a lack of rainfall during the dry season, leading to an increase in the level of the exceeded parameters.
Remedial Works and Follow-up Actions	The Contractors will further arrange a clean-up of the Interceptors to make sure the discharge effluents complies with the discharge limit.

Prepared by: Chris Ng, MT Representative

Date 3 April 2023