Technical Note

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Subject **MONITORING TECHNICAL NOTE TO SUPPORT SERF PERMIT APPLICATION ON BEHALF OF R&P CLEAN POWER LTD**

Introduction

This Monitoring Technical Note supports the application by R&P Clean Power Ltd for an Environmental Permit to operate a Part A(1) installation at the Swadlincote Energy Recovery Park (Energy from Waste (EfW) installation) under the Environmental Permitting (England and Wales) Regulations 2016, as amended (EPR)[1].

This Monitoring Technical Note will demonstrate how the activities taking place at the installation will comply with the requirements of the EPR, as well as how the site will meet the requirements of related to the air emissions monitoring arrangements specified within section 4 of the Environment Agency Part "B3" Form (New bespoke installation permit)[2].

Monitoring and reporting of emissions

Emissions to air

Monitoring of emissions to air from the main stack and backup diesel generator (emission point references A1 and A2 respectively) will use a combination of continuous and periodic/extractive monitoring techniques in-line with the Environment Agency's Monitoring Certification Scheme

[1] https://www.legislation.gov.uk/uksi/2018/110/contents/made
[2] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1038770/Application_for_an_environmental_permit_Part_B3__new_bespoke_installation_permit.pdf

(MCERTS), the requirements of BAT 4 of the waste incineration BAT Conclusions, and the requirements of the Medium Combustion Plant Directive.

Emissions from the thermal treatment process, discharged to atmosphere through the main stack (emission point A1), will be monitored continuously. A main CEMS system will be installed on the line, with a backup CEM also in place in order to provide full redundancy should any component of the main CEMS fail or require maintenance. It is expected that the CEMS system will comprise the following components, subject to the completion of the detailed design once an EPC Contractor has been appointed:

- Multi-component analysers including sample probe and heated sample line for continuous monitoring of emissions of NO_x, CO, SO_2, HCl, TOC, N_2O, NH_3, H_2O and O_2. The exact analyser types will be selected during detailed design with the final choice of method taking account of the Environment Agency's *Monitoring stack emissions: techniques and standards for CEMS and automated batch samplers* guidance;
- Particulate matter analyser;
- Ancillary analysers for gas velocity, temperature and pressure; and
- Data acquisition and handling system (DAHS).

All CEMS equipment will be MCERTS compliant, meeting the performance specifications in BS EN 15267-3 and holding QAL1 certification under BS EN 14181. The CEMS will be installed taking account of guidance in the Environment Agency's *Monitoring stack emissions: measurement locations guidance* (formerly Technical Guidance Note (Monitoring) M1), and the requirements of BS EN 15259, including the Environment Agency's Method Implementation Document (MID) for EN 15259. In particular, the sample ports will be installed in a vertical section of the stack of uniform cross-sectional area, at least two hydraulic diameters upstream from any bend or flow obstruction, and at least five hydraulic diameters downstream from any bed or obstruction (and at least five hydraulic diameters from the stack discharge point)

After installation, the analysers will undergo QAL2 functional tests and calibration with parallel measurements using standard reference methods in accordance with BS EN 14181, and the Environment Agency's *Technical Guidance Note M20 Quality assurance of continuous emissions monitoring systems - application of EN 14181*. The functional tests may be performed by the CEMS manufacturer but the parallel measurements will be taken using a test team accredited to BS EN ISO/IEC 17025. Ongoing automatic QAL3 calibration checks will be made using certified zero and span gases and/or reference spectra. All analysers will be subject to an annual surveillance test per the requirements of BS EN 14181 using a test team accredited to BS EN ISO/IEC 17025.

The CEMS and DAHS design will be based on satisfying the monitoring, reporting and compliance assessment requirements provided in Annex VI of IED. The DAHS will continuously log analogue and digital signals from the emission monitoring equipment with other signals from e.g., boiler temperature monitoring equipment monitored and recorded by the DCS. The system will have the capability to produce daily, monthly and annual reports of validated emissions data, as well as having functionality for reporting QAL2 and QAL3 data. The system will also be configured so that monitored parameters during start-up or shut-down of the furnace, or when no waste is being burnt, are excluded from the validated data, with only data reported during the effective operating time in accordance with Annex VI, Part 8 of IED. However, the raw data from these periods will still be

recorded and stored in the DAHS. The DAHS will meet the storage and data integrity requirements specified in the Environment Agency's *Quality and Performance Standards for Environmental Data Management Software* and/or BS EN 17255.

Periodic extractive monitoring will be performed for those determinands not requiring continuous monitoring under BAT 4. As permitted under Annex VI, Part 6, point 2.3 and footnote 7 of BAT 4, this will also include periodic monitoring of HF in preference to continuous monitoring, as the acid gas abatement system will operate to ensure the HCl emissions are stable and do not exceed the ELV.

Additionally, the Operator considers that the waste specification, controlled through contractual requirements with waste suppliers, will ensure a low and stable content of mercury in the waste, whilst the use of activated carbon in the APC plant will further ensure a low and stable level of mercury emissions. Consequently, in accordance with footnote 8 of BAT 4, the Operator is proposing to monitor mercury emissions using periodic extractive techniques in preference to continuous monitoring. The emissions performance of the Facility, with respect to mercury emissions, and demonstration of low and stable emissions, will follow the Environment Agency's Mercury Monitoring Protocol in the *UK Interpretation Document for the 2019 Waste incineration BAT Conclusions* (or otherwise agreed with the Environment Agency) with six, separate (i.e., samples taken on different days) extractive mercury results obtained during commissioning or, alternatively, a minimum of two tests per month will be taken until six results are available. If the six results are all < 10µg/Nm^3, Hg CEMS will not be installed.

Similar procedures will also apply to emissions of PCDD/Fs where, as per the Environment Agency's PCDD/F Monitoring Protocol in the *UK Interpretation Document for the 2019 Waste incineration BAT Conclusions*, if six separate extractive test results are less than the ELV, a continuous sampler will not be used.

To support the periodic monitoring, and QAL2 parallel measurements, a sampling platform with appropriate access, power supplies, lighting and facilities for lifting heavy items of equipment will be provided. Manual periodic sampling will be through sample ports installed in the stack meeting BS EN 15259 and the Environment Agency's *Monitoring stack emissions: measurement locations* guidance; these requirements will be included in the design specification for the plant.

Periodic monitoring would be undertaken by a MCERTS accredited test team certified to BS EN ISO/IEC 17025. Prior to any periodic sampling being carried out, a site specific protocol (SSP) will be developed by the test team under MCERTS requirements. The SSP and periodic monitoring reports will be provided to the Environment Agency as part of routine reporting.

Table 1-1 provides a summary of the monitoring of emissions to air from the main stack (emission point A1), whilst Table 1-2 provides a summary of the monitoring of emissions to air from the backup diesel generator (emission point A2).

Table 1-1 Summary of monitoring of emissions to air (A1)

Release point	Substance	Monitoring method	Monitoring frequency	MCERTS certified?
Main Stack (A1)	NOx	BS EN 15267 parts 1-3 and EN 14181	Continuous	Yes
	SO_2	BS EN 15267 parts 1-3 and EN 14181	Continuous	Yes
	CO	BS EN 15267 parts 1-3 and EN 14181	Continuous	Yes
	Particulate matter	BS EN 15267 parts 1-3 and EN 14181, and BS EN 13284-1	Continuous	Yes
	VOC (expressed as TOC)	BS EN 15267 parts 1-3 and EN 14181	Continuous	Yes
	HCl	BS EN 15267 parts 1-3 and EN 14181	Continuous	Yes
	HF	BS ISO 15713	Quarterly for the first 12 months and 6 monthly thereafter	Yes
	NH_3	BS EN 15267 parts 1-3 and EN 14181	Continuous	Yes
	Cd and Tl	BS EN 14385	Quarterly for the first 12 months and 6 monthly thereafter	Yes
	Hg	BS EN 13211	Quarterly for the first 12 months and 6 monthly thereafter	Yes
	As, Co, Cr, Cu, Mn, Ni, Pb, Sb, V	BS EN 14385	Quarterly for the first 12 months and 6 monthly thereafter	Yes
	PCDD/Fs	BS EN 1948 Parts 1-3	Quarterly for the first 12 months and 6 monthly thereafter	Yes
	Dioxin-like PCBs	BS EN 1948 Parts 1, 2 and 4	Quarterly for the first 12 months and 6 monthly thereafter	Yes
	PAHs [A]	BS ISO 11338 Parts 1-2	Quarterly for the first 12 months and annually thereafter	Yes
	N_2O	BS EN 15267 parts 1-3 and EN 14181	Continuous	Yes

[A] PAHs to be monitored include: Anthanthrene; Benzo[a]anthracene; Benzo[b]fluoranthene; Benzo[k]fluoranthene; Benzo(b)naph(2,1-d)thiophene; Benzo(c)phenanthrene; Benzo[ghi]perylene; Benzo[a]pyrene; Cholanthrene; Chrysene; Cyclopenta(c,d)pyrene; Dibenzo[ah]anthracene; Fluroranthene Indo[1,2,3-cd]pyrene; Naphthalene.

Table 1-2 Summary of monitoring of emissions to air (A2)

Release point	Substance	Monitoring method	Monitoring frequency	MCERTS certified?
Backup Diesel Generator (A2)	NOx	BS EN 14792	Every 1,500 operating hours or every 5 years, whichever is soonest	Yes
	CO	BS EN 15058	Every 1,500 operating hours or every 5 years, whichever is soonest	Yes

Monitoring during OTNOC

As per BAT 5, although it is expected that the plant will be running to normal operating conditions, any deviations to the plant running into OTNOC (other than normal operating conditions) would be captured by the installed CEMS. Dioxins and furans, and other compounds with periodic monitoring requirements, will also be monitored every three years during planned start-up/shutdown operations specifically whilst no waste is being burned. It should be noted that BAT AELs (daily averages) do not apply during periods of OTNOC, but IED Chapter IV limits for dust, TOC and CO in Annex VI, Part 3, Section 2 will apply during these periods.

Process variables

To ensure that the process is operating at optimum performance levels, and to meet the minimum requirements of IED, BAT 3 and the permit conditions, monitoring of the following process variables will be performed, as outlined in Table 1-3.

Table 1-3 Summary of monitoring of process variables

Line	Process variable	Description and monitoring frequency
Line 1	Combustion temperature	Continuous to demonstrate compliance with the minimum temperature requirement as required by IED Article 50(3)
	Combustion chamber oxygen content	Continuous to ensure optimal combustion conditions to minimise NO_x, CO and VOC emissions
	Combustion chamber pressure	Continuous to ensure under pressure is maintained and fugitive emissions are avoided. Also to detect and respond to any overpressure incidents

Line	Process variable	Description and monitoring frequency
	Flue gas temperature	Continuous monitoring as required by Annex VI of IED
	Flue gas pressure	Continuous monitoring as required by Annex VI of IED
	Flue gas water vapour content	Continuous monitoring as required by Annex VI of IED
	Flue gas oxygen content	Continuous monitoring as required by Annex VI of IED
	Flue gas flowrate	Continuous monitoring to allow calculation of the mass of pollutants emitted to air
	Reagent dosing rates	Continuous monitoring to ensure optimal consumption of reagents and control of emissions to air
	Pressure drop across fabric filter	Continuous monitoring to detect bag failures and initiate automatic cleaning to maintain plant efficiency
	Mass of waste delivered to the SERF Facility	Recording of the mass of each load delivered to the SERF Facility using the entry weighbridge to demonstrate compliance with maximum permitted throughput
	Mass of waste loaded to the furnace	Recording of mass of each load charged via grab crane to demonstrate compliance with design capacity
	Steam generation (and, where applicable, exported)	Continuous to track plant efficiency
	Total electricity generated	Continuous to track plant efficiency
	Electricity exported	Continuous to track plant efficiency
	Electricity imported	Continuous to track plant efficiency

Environmental monitoring (beyond the installation)

There is proposed to be no environmental monitoring beyond the installation, unless mandated by any planning or permit condition.