1 Purpose

The purpose of this document is to describe the functionality and monitoring strategy for the emissions control systems utilised by the United Kingdom Battery Industrial Centre (UKBIC). The Rowley Road facility is a permitted facility; the strategy defined in this document is designed to ensure compliance with the issued permit and provide documented evidence of how compliance has been achieved. This stack emissions monitoring strategy covers:

- monitoring location and sampling safety
- which substances to sample
- sampling methodologies and techniques
- sampling frequency
- collecting and reporting data

The monitoring strategy has been created to support UKBICs alignment to and compliance with the following regulatory documentation:

- EA Guidance: Monitoring stack emissions: guidance for selecting a monitoring approach
- EA Guidance: Monitoring stack emissions: measurement locations
- EA Technical Guidance Note M16: Monitoring volatile organic compounds in stack gas emissions
- Best Available Techniques (BAT) Conclusions for 'Surface treatment using organic solvents': BAT 1 (xv) implementation of a monitoring and measurement programme on Monitoring of Emissions to Air from IED Installations
- Statutory guidance: Coating of metal and plastic: process guidance note 6/23

The latest version of the permit is available on the Warwick District Council (WDC) website.

2 Scope

This document applies to the emission abatement systems installed on the Flexible Pilot Line (FPL) and Industrial Scale Line (ISL) at the UKBIC BIC site in Coventry.

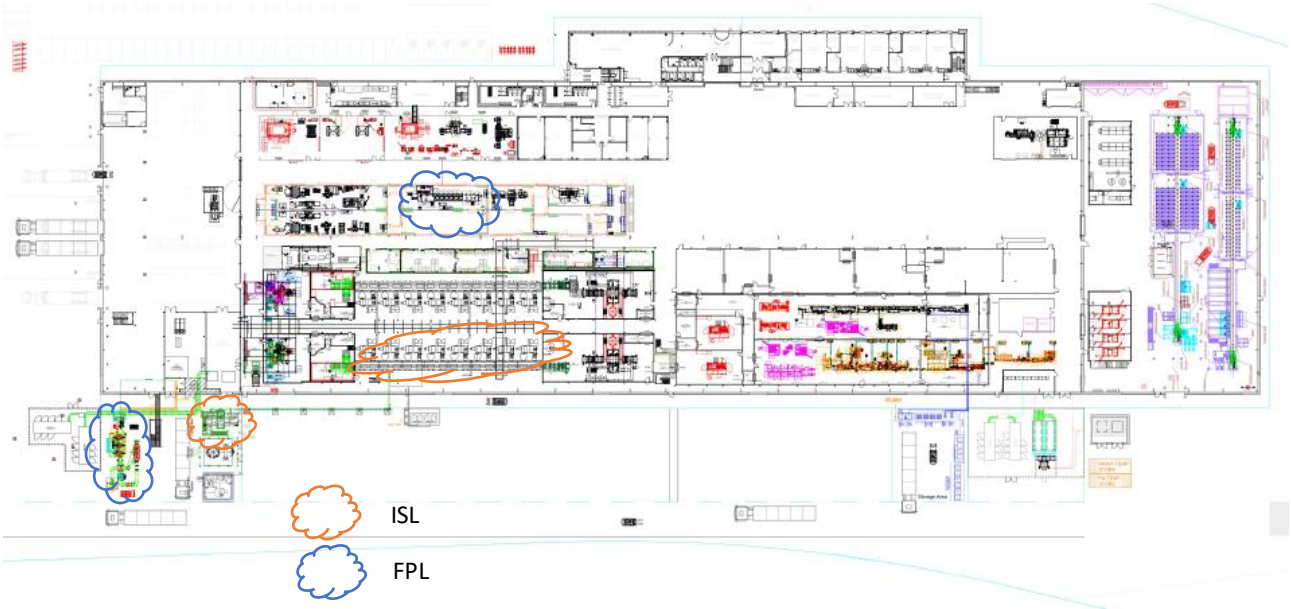

Fig. 1 Location of ISL and FPL process and abatement systems

2.1 Industrial Scall-up Line (ISL) Condenser & Carbon Beds

The cathode electrode process involves the coating of a "slurry", a mixture of substances including the volatile organic compound (VOC) N-Methyl-2-pyrrolidone (NMP), onto a thin aluminium foil. The coated foil is passed through a drier to remove NMP from the coating foil. This drying off of VOC laden material generates a point source emission to air that requires abatement (to meet emission limit values (ELV) and monitoring in accordance with the conditions of the sites Part B environmental permit.

The ISL abatement system is made up of extraction from the condenser and the extracted air is then fed to a dual carbon bed. The carbon bed is external to the building and the carbon bed is then exhausted through a single flue to atmosphere. This flue marks emissions point A1, as listed in the environmental permit.

The ISL cathode coating line only runs when there is a need to coat cathode foil. Due to the nature of UKBIC production, this is not a continuous process and only be run during customer requirements as part of a "campaign".

2.2 Flexible Pilot Line (FPL) Regenerative Thermal Oxidizer (RTO)

A similar (albeit smaller scale) coating and drying process is proposed (*subject to determination of a permit variation application*) on FPL, generating point source emissions for abatement and monitoring. FPL will also operate during fixed 'campaigns' in accordance with customer requirements. The primary solvent used on FPL will be NMP, however, the facility may in the future be utilised to trial other lower hazard VOCs such as ethanol, methanol, isopropyl alcohol, propyl acetate, acetone, and benzyl alcohol.

The FPL abatement system is a natural gas fired RTO, fitted with a post combustion Selective Catalytic Reduction (SCR). As a by product of the combustion activity, nitrous oxides (NO_X) and carbon monoxide (CO) air emissions will be generated. All treated waste gas will be exhausted from a single stack; this will mark air emissions point A2 on the environmental permit.

3 Responsibility

Managing Director (MD)

- to ensure the permit is maintained and provide adequate resources to ensure that all obligations described in the permit are maintained.

Director of Manufacturing Operations

- To ensure that obligations described in the permit are completed
- To ensure activities conducted on the line are in line with the permit

Head of Health, Safety and Environmental

- to ensure the activities necessary to meet the requirements of the permit are completed and records are available to support the evaluation of compliance.
- To lead the investigation of any permit breaches and liaise with relevant authorities.

Maintenance and Controls Manager

- To ensure the equipment is maintained and serviced appropriately.

4 Records

For record retention duration see control of documentation information procedure QA-PR-C004-000

Quality Record	Media	Document Number	Location
External emissions test results	Electronic	N/A	HSE SharePoint site
Operation tracking sheet	Electronic	OP-FO-H004-030	Operations SharePoint Site
Solven management tracker	Electronic	OP-FO-H004-036	Operations SharePoint Site

5 MCERTS Stack Monitoring Locations and Sampling Safety

Only appropriately MCERTS (Monitoring Certification Scheme) and UKAS (United Kingdom Accreditation Service) certified stack emissions monitoring contractors will be commissioned to undertake permit compliance monitoring.

The sampling locations for use during MCERT accredited air emissions monitoring at both A1 and A2 are safely accessible. In both cases, there is a permanent fixed platform to allow safe access to the stack monitoring ports. Each platform was designed and constructed to provide the appropriate load bearing capacity, and physical space, to enable MCERTS accredited monitoring to be undertaken. This is accessible via stairs. There is a sample port in the stack meeting the relevant location and sizing requirements to allow stack emissions monitoring to be MCERT certified.

Figure 2: Carbon Scrubber Stack (A1) Monitoring Platform

Figure 3: Carbon Scrubber Stack (A1) Sampling Port

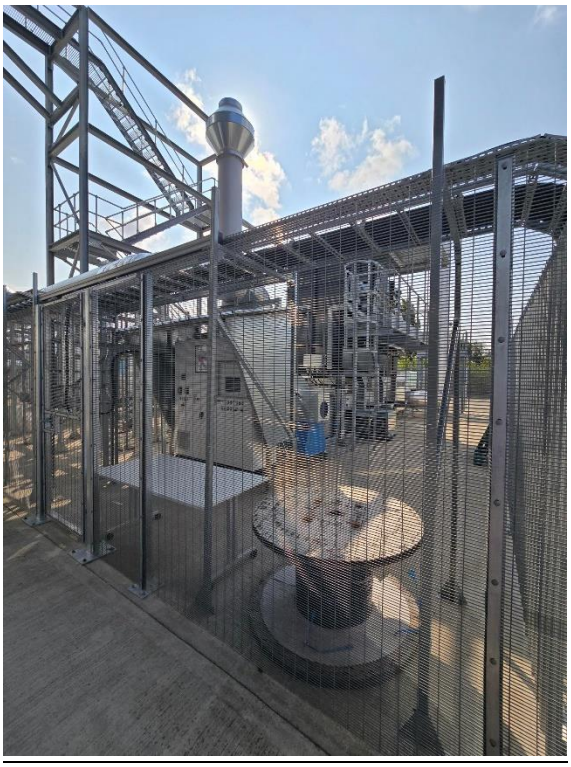

Figure 4: RTO (A2) Monitoring Platform

Figure 5: RTO (A2) sample port

Ahead of any external emissions testing visits, the stack monitoring contractors will provide a Site Specific Protocol (SSP) for review by UKBIC. This will describe the monitoring locations, monitoring methods and outline key safety considerations. The provision and review of an SSP is required as part of MCERTS and UKAS accreditation. Additionally, the monitoring contractors will provide a Risk Assessment Method Statement (RAMS) for review and sign off by UKBIC ahead of conducting monitoring.

6 Emissions Monitoring

6.1 Table of Emissions Limits:

Emissions Point	Parameter	Limit to Achieve	Monitoring Standard
A1 (ISL Stack)	N Methyl-2-Pyrrolidone (NMP)	[3] 20 mg/Nm^3 at less than 10g/h 2 mg/Nm^3 at or above 10g/h	EN 12619
A2 (FPL Stack)	Oxides of Nitrogen (measured as nitrogen dioxide)	[1] 100 mg/Nm^3	EN 14792
A2 (FPL Stack)	Carbon Monoxide	[1] 100 mg/Nm^3	EN 15058
A2 (FPL Stack)	VOC expressed as total mass of organic carbon	[2] 50 mg/Nm^3	EN 12619
A2 (FPL Stack)	N Methyl-2-Pyrrolidone (NMP)	[3] 20 mg/Nm^3 at less than 10g/h 2 mg/Nm^3 at or above 10g/h	EN 12619

[1] Limit derived from Process Guidance Note 6/23(11)

[2] Limit derived from Annex IIA of the Solvent Emissions Directive

[3] Limits in accordance with Part 4 of Annex VII of the Industrial Emissions Directive (IED). Emissions of 10/g/hr of all substances listed in Article 58 of the IED (e.g. solvents classified as toxic to reproduction under Regulation (EC) No 1272/2008) will be limited to 2 mg/Nm^3. For emissions at less than 10g/hr, the required emissions limit is set at 20 mg/Nm^3 in accordance with the Notice of Determination issued by WDC on 06/07/2020.

6.2 Table of Monitoring Standards

Parameter	Monitoring Standard	Process Description [1]
TVOC	BS EN 12619:2013	A flame ionization detector (FID) undertakes a continuous measurement for at least 60 minutes. The methodology measures the mass concentration of total gaseous organic carbon. Additional parameters including volumetric flow rate, flow velocity, temperature and moisture are also measured. Accredited analysis is used to present a TVOC result as Carbon, at reference conditions. All results will be certified MCERTS and UKAS.
NMP	BS EN 12619:2013	There is no available accredited methodology for the direct measurement of NMP. The BS EN 12619:2013 is used to determine TVOC. The stack emissions monitoring specialists undertake a calculation, based on the mass weight of NMP, to express TVOC as NMP. All results will be certified MCERTS and UKAS.
NO_X	BS EN 14792:2017	NO_X is measured in accordance with the chemiluminescence principle. A portable sampler is used to extract gas from the stack and measure NO_X using chemiluminescence in real time. The sampling duration will be a minimum of 60 minutes. Additional parameters including volumetric flow rate, flow velocity, temperature and moisture are also measured. NO_X is expressed at reference conditions as NO_2. All results will be certified MCERTS and UKAS.
CO	BS EN 15058:2017	CO is measured in accordance with the infrared (IR) absorption principle. A portable sampler is used to extract gas from the stack and measure CO using IR absorption in real time. The sampling duration will be a minimum of 60 minutes. Additional parameters including volumetric flow rate, flow velocity, temperature and moisture are also measured. CO is expressed at reference conditions as CO. All results will be certified MCERTS and UKAS.
[1] In all cases, the monitoring period will cover 'normal' operations. This is during the coating, drying and gas abatement window. Monitoring will not be conducted during start up or shut down of coating and drying operations, or during the startup and shut down of air emissions abatement technology.		

7 MCERTS Monitoring Schedule

The emissions monitoring described in Section 6 will be undertaken at both A1 and A2 air emissions points quarterly. This quarterly monitoring is subject to client usage (or UKBIC's in-house test campaigns) of the equipment in the monitoring window. Following the receipt of two years of quarterly monitoring results demonstrating compliance, UKBIC will seek to agree with the regulator to extend stack emissions monitoring to annually.

For the ISL the monitoring process will include four samples:

1. **Drier warm up** – system getting up to temperature, no coating. Only residual or no solvents should be detected.

2. **Steady coating** – Two samples shall be recoded at timed intervals during the coating process.

3. **Cool down** – Once the coating process has concluded the drier continues to run, with monitoring during this period

Temperature and air flow rates at the stack monitoring point are recorded during the tests

8 Collection, Retention and Reporting of Data

The regulator will be informed a minimum of 7 working days in advance of MCERTS stack emissions monitoring. The data will be provided to the regulator within 8 weeks of the completion of the sampling. All records from sampling and analysis will be retained by UKBIC and available for review for a minimum of 5 years.

In the event of a breach of emission limits, the results will be provided to the regulator within 24 hours from the receipt of the emissions monitoring report. An investigation will be conducted in accordance with relevant processes and procedures. Following the completion of any required actions, monitoring will be rebooked and completed.

9 Revision History

Issue	Revision Date	Description of Changes	Prepared By	Approved By
1	23 Nov 2021	Initial Release	M Cuttler	M Cuttler
2	05 Aug 2025	Review and inclusion of FPL RTO	A Carey	S Gardner
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