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R100 LTD

APPLICATION TO VARY PERMIT EPR/GP3439QK

ADDENDUM TO OPERATING TECHNIQUES

NOVEMBER 2022

wardell armstrong

Wardell Armstrong
Sir Henry Doulton House, Forge Lane, Etruria, Stoke-on-Trent, ST1 5BD, United Kingdom
Telephone: +44 (0)1782 276 700 www.wardell-armstrong.com

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NOVEMBER 2022

PREPARED BY:

Alison Cook Technical Director

APPROVED BY:

Luke Prazsky Service Director - Waste Resource Management

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DRAWINGS	TITLE	SCALE
ST19734-004	Permit Boundary Showing Emission Points	1:500
-	40,000 litre Stainless Steel Oil Storage Tank (Elite Engineering)	
21503	ELNG 80/18 CS Control Panel	

1 INTRODUCTION

1.1.1 R100 Ltd have commissioned Wardell Armstrong to prepare an application to vary the permit for their site at Spaldington Airfield, permit number EPR/GP3439QK.

1.1.2 The site is located in East Yorkshire at the following address, Spaldington Airfield, Spaldington, Howden DN14 7NG. The permit was issued on 21st October 2019. The business has developed since then and as a result a number of variations need to be made to the permit.

1.1.3 The site operates as an anaerobic digestion facility, generating biomethane (gas) for the National Grid and a PAS 110 compliant digestate, which is sold to local farmers for use as a soil improver.

1.1.4 The site is in mainly agricultural area, largely surrounded by fields, though there are other waste sites to the west and a wind farm to the east.

1.1.5 This document provides details regarding the new operations on site, including the new waste treatment process, the natural gas CHP and the battery unit. The revised site layout is shown as drawing ST19734-004.

2 RECOVERY OF BIO-OIL

2.1 Waste Treatment

2.1.1 Bio-oils recovered from plant matter and animal fats can be processed into useful products such as bio-fuels. The new waste treatment process at R100 will be used to extract these oils so that they can be sent off site to a third party recycling facility.

2.1.2 The oils will be extracted prior to the pasteurisation process. Waste that is sent to the oil-separation centrifuge is fed from the heat exchanger feed line. The higher temperatures reduce the viscosity of the oils and aid extraction.

2.1.3 The oils will be extracted using an oil recovery system installed by Alfa Lavall. This will use centrifugal forces to separate the lighter oils from the heavier water and remaining food waste. The extracted oil will classify as an animal by-product falling under Category 3 of the Animal By-products Regulations (ABPR).

2.1.4 The system operates at between 70°C and 95°C. This is in line with the existing pasteurisation process which requires waste to be treated at a minimum temperature of 70°C in order to destroy pathogens that may be present in the waste.

2.1.5 The food waste will be fed into the system via an enclosed pipeline, entering the decanter centrifuge through a stationary pipe. The centrifuge consists of a horizontal cylinder (the bowl) with an internal screw conveyor. These elements rotate at different speeds. The bowl has a maximum speed of 3,100 revolutions per minute (rpm) and the speed can be adjusted to achieve the best separation of the oils and other waste.

2.1.6 To operate effectively solids entering the centrifuge should be restricted to less than 12mm in diameter with an optimal range of 8mm to 10mm. Again, this is in line with the requirements of the Animal By-Products Regulations. The incoming waste is already depackaged and macerated to reach this particle size prior to the pasteurisation process, in order to achieve effective treatment.

2.1.7 As waste passes through the system the centrifugal force enhances the normally expected settlement with solid food waste settling on the inner wall and oils floating to the surface of the water in the system. The oils will flow off over an adjustable plate dam into the casing, whilst the screw auger will collect the solids and feed them to the de-oiled slurry outlet.

2.1.8 The solids and water will be recombined at the outlet and returned to the pre-pasteurisation circuit passing back via the pasteuriser before being batch fed to the digester in the normal way for treatment and gas recovery.

2.1.9 The oils leave the centrifuge via a rotary filter, which removes any floating particles, allowing them to be fed back to the AD plant. The clarified oil will be collected in the oil tank, awaiting collection for recycling at a permitted site.

2.1.10 Appendix 1 provides detail of the centrifuge and associated equipment. Although this specification relates to the company's Hemswell site, the equipment to be installed at R100 is the same.

2.2 Control of Emissions to Water from the Centrifuge

2.2.1 The centrifuge is supplied on a skid which includes a galvanised steel drip tray with a mesh top. Should there be any leakage or spillage this will run through the mesh and be collected in the drip tray. The drip tray is designed to fall to a 50mm drain point which will convey any spilled waste to back into the existing site drainage system, which feeds back into the start of the AD process.

2.2.2 The centrifuge will be constructed of steel with tungsten carbide tiles forming a liner to guard against corrosion. All connections will be checked before the system is commissioned to ensure they are watertight.

2.2.3 The centrifuge will be added to the Preventative Maintenance Programme for the site and will be inspected on a regular basis, with any necessary servicing and maintenance being carried out in accordance with Alfa Lavall's recommendations.

2.2.4 Both the centrifuge system and the bio-oil tank will be located within the main site bund. All waste is therefore expected to be fully contained and there should be no emissions to land or water.

2.3 Control of Emissions to Air from the Centrifuge

2.3.1 Treatment of food waste has the potential to allow the release of volatile compounds to air. To manage this waste is treated in a fully enclosed system. There will be no emissions to atmosphere other than via the breathing vent on the vessel. This vent is to prevent over pressure in the vessel, by allowing displaced air to vent during filling. All such emissions will be via an odour control system.

2.3.2 The odour control system will consist of a carbon filter to ensure that odorous compounds are captured before air from the system is vented to atmosphere. These filters have been successfully used elsewhere on site and by other companies with the BioteCH_4 group for several years, proving effective at controlling odour.

3 STORAGE OF BIO-OIL

3.1.1 Oil from the process will be stored in a 40,000 litre fully bunded tank pending transfer to the recycling site. The tank will have a working capacity of 40,000 litres and maximum capacity of 45,000 litres and will be insulated and clad to protect it during the winter months.

3.1.2 Construction of the tank will be identical that provided for Thornfield Energy and shown in the drawing "40,000 litre Stainless Steel Oil Storage Tank" provided by Elite Engineering.

3.1.3 The tank will be located within the existing site bund. This large concrete bund has been constructed to contain any spillage in the event of failure of one of the digesters and is more than adequate to contain any leakage from the bio-oil tank.

3.1.4 The tank has a breathing vent to manage the pressure during filling and emptying. To guard against odorous emissions to air this is vented via a carbon filter. All carbon filters will be checked monthly to ensure they are functioning correctly and the carbon will be replaced as required.

3.1.5 Oil will be collected by road tanker. Tankers will be filled in accordance with the written procedures for filling tankers that already form part of the Environmental Management System for the site.

4 NATURAL GAS CHP

4.1 CHP

4.1.1 The permit currently allows for the use of two biogas fired CHP units with a combined thermal input of 5.98MW. Instead, it is proposed to operate the engines using natural gas.

4.1.2 This has the advantage of lower emissions. Unlike biogas, natural gas does not produce sulphur dioxide during combustion. It is a clean fuel with very low emissions compared to other fuels.

4.1.3 Each of the two engines will have a maximum electrical output of 1MW. This electricity will be used to power the plant. Any excess electricity will be stored in the battery unit for use at another time.

4.1.4 Each engine will have a thermal input of 2.38MW. The specification for the CHP engines is shown in Appendix 2.

4.1.5 The CHP units are new units and will comply with the emission limit values for new gas engines as set out Annex II of the Medium Combustion Plant Directive. The engine supplier has confirmed that the sampling points from the engines conform with the Environment Agency's TGN M5 guidance, which is considered adequate. Although the engines do not fall within the description in SR 2018 No.7, because they generate electricity, the equipment specification and associated environmental risk are considered to be analogous to a low risk standard rules medium combustion plants.

4.1.6 Natural gas will be sourced from the site, following treatment and immediately before entry to the grid. Gas may be stored in a liquid natural gas tank.

4.1.7 The liquid natural gas (LNG) tank will be located adjacent to the gas holder. Supplied by VRV the tank will be of suitable construction and features level and pressure gauges

in order to monitor the tank contents. The tank has a gross capacity of 80,805 litres and will operate at 85% full (giving a net capacity of 68,685 litres.

4.1.8 A pressure relief valve is provided as a safety mechanism but where gas is managed effectively and the tank is properly maintained emissions to air should be negligible. The specification of the tank is shown in drawing 21503.

4.2 Control of Emissions to Air

4.2.1 The gas engines will be operated in accordance with the Medium Combustion Plant Directive (MCPD) so that they represent best available techniques (BAT). That is, they will meet an emission limit for NO_X of 95mg/m^3, when measurements are corrected to standard temperature and pressure and 15% oxygen.

4.2.2 Emissions from the natural gas engines will be monitored on commissioning and then once every three years to demonstrate that these standards are being met.

4.2.3 The DSEAR assessment for the site will be reviewed ensuring that all flammable gas is stored safely and that fire and explosion risks are controlled.

4.3 Monitoring of Emissions to Air

4.3.1 Emissions to air will continue to be monitored in accordance with the permit conditions. It is intended that emissions from the CHP will be monitored at least once every three years to monitor emissions of oxides of nitrogen in accordance with the Medium Combustion Plant Directive.

4.3.2 The Environment Agency released new guidance on monitoring emissions to air in the summer of 2022. For many installations this requires that monitoring points accord with BS EN 15259. This is particularly important in relation to monitoring of particulates.

4.3.3 A lesser standard is permitted for low risk MCP which is subject to the standard rules and similar plant. The engine supplier has confirmed that provision for sampling is in accordance with TGN M5, which maps across to this guidance for low risk MCP.

4.3.4 Although the plant is not eligible for standard rules, because it is used for production of electricity, the specification of the plant and associated emissions are expected to be similar. It therefore seems appropriate that this guidance should apply in this case.

4.3.5 Because the plant will burn natural gas, emissions of particulates will not be produced and the specifics around monitoring emissions of particulates, set out in BS EN 15259, do not need to be taken into consideration.

4.4 Air Quality

4.4.1 No Air Quality Assessment has been provided with this application as the site has been previously permitted for the use of 2 CHP units utilising biogas. A full air quality assessment was provided at the time of the original application and demonstrated that there would be no impact on air quality from the use of these two gas engines.

4.4.2 Effectively the variation will mean that the fuel in these gas engines has been replaced with a different, cleaner fuel. The emissions to air are therefore expected to be lower than those previously approved and permitted by the Environment Agency.

5 BACK-UP GENERATOR

5.1 Use of the Back-up Generator

5.1.1 The back-up generator will operate to top up the battery, whenever the main CHP is down for maintenance, ensuring a steady supply of energy for the digestion and oil recovery process. It is intended that the generator will operate using standard diesel.

5.1.2 The specification for the generator is shown Appendix 3

5.1.3 Whilst the emissions from diesel are not as low as those for natural gas, it is intended that the generator will be used as a back-up only and that it will operate for less than 500 hours a year.

5.1.4 Because the generator will operate for less than 500 hours a year no emission limits apply and there is no requirement for monitoring (in accordance with the Environmental Permitting (England and Wales) (Amendment) Regulations 2018).

5.1.5 Diesel for the generator will be stored in an appropriately bunded tank. The specification for the tank is shown in Appendix 4.

APPENDICES

APPENDIX 1

Alfa Lavall Proposal

APPENDIX 2

Specification for Gas Engines

APPENDIX 3

Specification for Back-up Generator

APPENDIX 4

Specification of bunded diesel tank

DRAWINGS

wardell-armstrong.com

STOKE-ON-TRENT
Sir Henry Doulton House
Forge Lane
Etruria
Stoke-on-Trent
ST1 5BD
Tel: +44 (0)1782 276 700

BIRMINGHAM
Two Devon Way
Longbridge Technology Park
Longbridge
Birmingham
B31 2TS
Tel: +44 (0)121 580 0909

BOLTON
41-50 Futura Park
Aspinall Way
Middlebrook
Bolton
BL6 6SU
Tel: +44 (0)1204 227 227

BRISTOL
Temple Studios
Temple Gate
Redcliffe
Bristol
BS1 6QA
Tel: +44 (0)117 203 4477

BURY ST EDMUNDS
Armstrong House
Lamdin Road
Bury St Edmunds
Suffolk
IP32 6NU
Tel: +44 (0)1284 765 210

CARDIFF
Tudor House
16 Cathedral Road
Cardiff
CF11 9LJ
Tel: +44 (0)292 072 9191

CARLISLE
Marconi Road
Burgh Road Industrial Estate
Carlisle
Cumbria
CA2 7NA
Tel: +44 (0)1228 550 575

EDINBURGH
Great Michael House
14 Links Place
Edinburgh
EH6 7EZ
Tel: +44 (0)131 555 3311

GLASGOW
24 St Vincent Place
Glasgow
G1 2EU
Tel: +44 (0)141 428 4499

LEEDS
36 Park Row
Leeds
LS1 5JL
Tel: +44 (0)113 831 5533

LONDON
Third Floor
46 Chancery Lane
London
WC2A 1JE
Tel: +44 (0)207 242 3243

NEWCASTLE UPON TYNE
City Quadrant
11 Waterloo Square
Newcastle upon Tyne
NE1 4DP
Tel: +44 (0)191 232 0943

TRURO
Baldhu House
Wheal Jane Earth Science Park
Baldhu
Truro
TR3 6EH
Tel: +44 (0)187 256 0738

International office:

ALMATY
29/6 Satpaev Avenue
Hyatt Regency Hotel
Office Tower
Almaty
Kazakhstan
050040
Tel: +7(727) 334 1310

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