



**From:** Ross, Stuart  
**To:** Bradford, Julie  
**Subject:** FW: Waen Commissioning  
**Date:** 12 May 2014 13:45:26  
**Attachments:** [WAEN Commissioning Plan RevA.pdf](#)  
**Importance:** High

For public register  
Cheers

Stu

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**From:** Kate Lister [mailto:Kate.Lister@biogen.co.uk]  
**Sent:** 08 May 2014 14:54  
**To:** Ross, Stuart  
**Cc:** Lee Lockett  
**Subject:** Waen Commissioning  
**Importance:** High

Stuart,

Further to our conversation yesterday, please find attached the commissioning plan. There are some further comments which will hopefully address the matters you will be concerned with, these are as follows:

- We are initially only looking to seed D1, this was following an onsite risk assessment yesterday when reviewing valve security, cordoning off and any on-going works in the bunded area. To this end, D1 will be segregated by tape to prevent an isolation zone around the digester such that no traffic or unauthorised personnel enter the area thereby reducing the environmental and safety risks.
- The displaced air and off-gases during the initial seeding will be vented through the wessoa (pressure relief valve), the liquid relief hatch will be closed. As stated this is the method by which we have commissioned all of our sites, to date we have never received odour complaints as a result of this exercise as any odour generated has been minimal and is dispersed at high level. We are left with little option but to vent for safety reasons due to the potential explosive mix in the initial stages. It is anticipated that we will vent for the first week, this would equate to approximately 100m<sup>3</sup> of gas being vented in 4-5 days. We will not be gas mixing at this stage and will undertake only a small amount of hydraulic mixing to sustain bacterial populations and health.
- Once the gas is safe (non-explosive oxygen content) the gas will be burnt in the surplus gas burner, initially we will utilise propane to assist the burn as the gas quality will be low. This will be until such time that the methane content is sufficient to sustain combustion.
- We are looking to approximately 3 deliveries on Monday and Tuesday next week, this may increase to 5 by the middle to end of the week and will be dictated by vehicle journey times as we have tankers on turnaround.
- Responsibilities have been clearly defined and these individuals will be fully briefed prior to commencement.
- Environmental checks will be implemented and documented, these will be available for inspection.

I am looking to attend Waen on Thursday to undertake an internal compliance inspection and conduct an off-site impact assessment to ensure our operations are not causing disturbance.

I trust this addresses PM02 under table S1.3 'Pre-operational measures', however please do not hesitate to contact me if you wish to discuss this further.

Kind regards,

Kate

**Kate Lister | Environment Manager | Biogen**

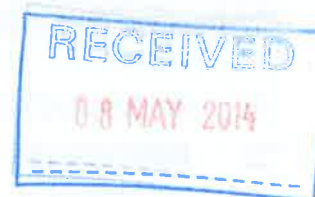
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**Scheme:** Waen ANAEROBIC DIGESTION PLANT

**Client:** Biogen Waen

**Engineer:** Greenfinch  
The Business Park  
Coder Road  
Ludlow  
SY8 1XE

**Contract Reference:** WAEN

**Document Title:** COMMISSIONING PLAN

**Document No:** Waen-A-176

**Revision:** Rev A

**Date:** 5 March 2014

**Author:** Julian Stelmasiak

| Issue | Description                | Author | Checked | Date    |
|-------|----------------------------|--------|---------|---------|
|       | Draft                      | JS     |         | 5.3.14  |
| A     | Issue for external parties | JS     | DW      | 26.3.14 |
|       |                            |        |         |         |
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# **WAEN ANAEROBIC DIGESTION PLANT**

## **COMMISSIONING PLAN**

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## **1. INTRODUCTION**

- 1.1. Greenfinch has constructed a new anaerobic digestion plant at Waen St Asaph
- 1.2. The anaerobic digestion plant is designed to process approximately 12,500 tonnes per year of unpackaged domestic and commercial food waste.
- 1.3. The principal stages of the process are: - food waste reception, food waste conditioning, buffer storage, primary digestion, pasteurisation, digestate screening and digestate storage.
- 1.4. The biogas produced by the anaerobic digestion process is used to fuel a combined heat & power (CHP) unit, which produces electricity for export to the grid, together with heat in the form of low temperature water for use in the process and for building heating and hot water.
- 1.5. The Greenfinch Commissioning team is responsible for the commissioning of the anaerobic digestion plant and its hand over to the Biogen Waen operations team.
- 1.6. This document is to be read in conjunction with the following drawings:-
  - Slurry Engineering Line Diagram (ELD)
  - Gas Engineering Line Diagram (ELD)
  - Water Engineering Line Diagram (ELD)
  - Pneumatics Engineering Line Diagrams
  - Biogen Waen Digestate Log Sheet.
  - Biogen Waen Monitoring Sheet No.1.
  - Biogen Waen Monitoring Sheet No.2.
  - Biogen Waen Monitoring Sheet No.3.

## **2. RESOURCES**

### **2.1. The following are the key personnel:-**

|                       |                   |
|-----------------------|-------------------|
| Project Manager       | Andy Halliday     |
| Site Manager          | Liam O'Kane       |
| Commissioning Manager | Julian Stelmasiak |
| Plant Manager         | Lee Locket        |
| Process Engineer      | Tom Goodwin       |
| Mechanical Engineer   | Paul Braddock     |
| Electrical Engineer   | Steve Frost       |
| Environment Manager   | Kate Lister       |
| Environment Assistant | Joely Slinn       |
| Research Manager      | Becky Arnold      |
| Laboratory Scientist  | Sophie Atherton   |
| First Aider           | Liam O'Kane       |
| First Aider           | Julian Stelmasiak |

### **3.2. Responsibilities**

For the commissioning period the Site Manager is in charge of day to day operations on site, reporting to the Project Manager until the plant is handed over to Biogen Waen.

The Commissioning Manager is responsible for the delivery of the commissioning activities and co-ordinates Greenfinch and Supplier staff in conjunction with the Site Manager

The Plant Manager is responsible for supervising tankering and food waste delivery operations and co-ordinates with the Commissioning and Site Managers to assist with the delivery of the commissioning.

### **3.3. Equipment**

The following specialist equipment is available for use:-

- Katronic external flow meter
- Portable gas analyser.
- Gas pressure instrument.
- Hand-held temperature instrument.
- Draeger tube gas analyser

### **3.4. The following temporary plant & equipment is provided for the commissioning period:-**

- Oil boiler for hot water circuit.
- Temporary tanker loading fitting attached to valve in reception hall on pipe into buffer tank (V12).
- Portable pressure washer.
- Portable air compressor.

### **3. HEALTH & SAFETY RULES**

- 3.1. Safety is of paramount importance because the digestion plant produces flammable gas and because of all the normal risks associated with large process plant.
- 3.2. Safety boots are to be worn at all times.
- 3.3. High visibility jackets or vests are to be worn at all times.
- 3.4. Smoking is not permitted within the site boundary.
- 3.5. No alcoholic drinks of any kind may be brought to the site, and no-one will be permitted to work when considered to be under the influence of alcohol or drugs.
- 3.6. Red & White barrier tape is used to mark safe areas during testing. Only authorised personnel may enter the taped areas.
- 3.7. Maintain the site in a tidy condition at all times and place all waste in the designated locations.
- 3.8. Obey all speed limits and traffic control.
- 3.9. The entrance gate will be normally closed.
- 3.10. Visitors will only be permitted on site with the express permission of the Commissioning Manager. They must sign the visitors' book; must be accompanied by a member of the BiogenGreenfinch staff at all times; and they must wear a highway jacket or vest.
- 3.11. Report all injuries, accidents and dangerous occurrences to the Plant Manager. Ensure that these are recorded in the site accident book, which is kept in the weighbridge office.
- 3.12. Inform a medical officer treating an injury that the work involves contact with food waste.
- 3.13. The nearest Accident and Emergency Hospital is Glan Clwyd Hospital Rhuddlan Rd. Bodelwyddan, Rhyl. LL18 5UJ Tel 01745 583910, approximately quarter of an hour drive away.

## **4. SITE HAZARDS**

### **Biogas**

Biogas is a mixture of approximately 60% methane and 40% carbon dioxide with traces of other gases including hydrogen sulphide.

Biogas is flammable and mixtures of biogas and air can form explosive atmospheres.

Pipelines and vessels containing biogas should not be opened except under controlled conditions authorised by a competent person.

Except for emergency relief valves all biogas valves opening to air are capped to prevent accidental release of biogas.

The presence of hydrogen sulphide and other odorous trace gases mean that leaks of biogas can often be detected by smell.

### **Hydrogen Sulphide**

Hydrogen sulphide is produced by decomposing organic material and is a varying component of biogas.

Hydrogen sulphide is an irritant at low concentrations, toxic at high concentrations and at higher concentrations is also flammable.

Where there is the possibility of hydrogen sulphide being present personnel are issued with personal monitors which provide warning of the presence of the gas.

Hydrogen sulphide can be present in toxic concentrations in biogas and any venting operations are to be carried out under controlled procedures authorised by a competent person.

### **Biohazards**

Food waste is a good breeding ground for bacteria particularly Salmonella and Enterobacteriaceae.

Food waste can also contain contaminants which can cause cuts and allow the entry of bacteria.

Personnel working with food waste should wear protective gloves.

Any cuts should be immediately cleaned and protected.

Personnel should wash their hands and faces thoroughly with soap and hot water before eating or drinking.

### **Automatic Control**

The plant is operated automatically by a Programmable Logic Controller. Machinery, burners and valves will operate without warning.

Maintenance and inspection shall not be carried out on equipment unless it has been authorised by the Site manager and the appropriate isolation procedures have been put in place.

### **Confined Spaces**

All vessels, tank, pits and hoppers are designated Confined Spaces.

Confined Spaces may only be entered by trained personnel in possession of an authorised confined space permit which will set out the procedures and controls for entering the space.

### **Working at Height**

Safe access and working platforms are provided for normal maintenance on the tanks.

Any task requiring personnel to work outside the guarded walkways requires a specific permit authorised by the Site manager

### **Noise**

The engine space of the container housing the CHP has high levels of noise when the engine is running. The engine room doors are to be kept closed to contain the noise.

Entry to the engine room while the engine is running is only to be carried out by authorised personnel wearing the correct hearing protection.

Normal maintenance is carried out with the engine stopped.

There are other hearing protection zones on site, these are indicated by blue "mandatory hearing protection" signs and may only be entered by personnel wearing the correct hearing protection.

### **Deep Water**

The digestate storage vessel contains deep water and presents the risk of drowning.

There is no requirement under normal operating or maintenance routines to work over or in the digestate tanks. Any activity that requires personnel to work over or in the tanks is subject to a specific work permit authorised by the Site manager.

Any work inside tanks is subject to a specific work permit authorised by the Plant Manager.

### **Environmental Hazards**

The activities undertaken at the plant can, under uncontrolled conditions, have a negative impact on the wider environment. The main hazards are:

1. Release of odours from the processing areas or vessels
2. Spillage of digestate which could contaminate waterways or be a source of odour

Such events may be in breach of the site Environmental Permit and such events must immediately be reported to the Site manager and Environment Manager.

## **5. PLANNING CONDITIONS**

- 5.1. From planning approval 47/2012/1120/PF, the following planning conditions are to be noted during the commissioning phase of the project.

### **Planning Condition 6**

Construction activities are to be 07:00 & 19:00 Monday to Friday  
and 07:00 & 13:00 Saturdays

### **Planning condition 8**

Operational Phase hours for deliveries are 08:00 & 18:00 Monday to Friday  
and 08:00 & 16:00 Saturday

### **Planning condition 17**

No Load shall enter or leave the site un-sheeted

## **6. ENVIRONMENTAL COMPLIANCE**

- 6.1. Environmental management is important because of the potential risk of odour emissions and of water pollution from tanker spillage.
- 6.2. It is a requirement of the Planning Conditions and Environmental Permit that odour emissions are kept to a minimum both during the commissioning process and during normal plant operation.
- 6.3. The gas air mix produced during the start of seeding will be vented at high level to disperse the potentially explosive mix at a safe height. Approximately 100m<sup>3</sup> of gas will be vented per day for 4-5 days.
- 6.4. Once the gas is safe (non-explosive oxygen content) the gas will be burnt in the surplus gas burner, with the assistance of propane until the methane content is sufficient to sustain combustion.
- 6.5. Tanker unloading will take place within the Reception hall to contain odour and for spill containment.
- 6.6. All temporary pipework will be within the process bund to contain a spillage.
- 6.7. The odour treatment system will be operational prior importing of foodwaste.
- 6.8. The Plant Manager is responsible for ensuring the tankering procedure is being adhered to.
- 6.9. The Plant Manager will walk the site at least twice per day during the tankering operations to monitor any emissions of odour or any spillages. Any incidents must be recorded and the file kept in the weighbridge office.
- 6.10. The Plant Manager shall have the authority to instruct the Commissioning Manager to cease tankering operations should an adverse environmental incident occur.
- 6.11. The Plant Manager will keep a log of all tanker movements and other relevant data.
- 6.12. The Plant Manager will ensure that all litter is collected and disposed of daily.
- 6.13. The Plant Manager will keep a record of all complaints and responses to them. This file is to be held in the weighbridge office.

## **7. COMMISSIONING PROGRAM**

### **7.1. Phase 1 cold commissioning**

- Motor rotation tests
- E-Stop tests
- Tank High level Probes test
- Sump Probes test
- Zone Panel Testing
- Air system testing
- AV testing
- Gas mixing AV test
- Instrumentation setup
- PLC/SCADA setup
- I/O Testing
- Fill and de-air hot water header

### **7.2. Phase 2 Heating and mixing of digester No1**

- Close, make safe and block access to digester No1
- Transfer 50% (300m<sup>3</sup>) of RWBT contents to digester No1
- Start Temporary oil boiler and heating @ 16% level
- Start Hydraulic mixing @ 8% level
- Start gas mixing @ 20% level

### **7.3. Phase 3 Seeding of digester No1**

- Install temporary line from RWBT inlet bypass to digester 1
- Import 1500m<sup>3</sup> of active slurry into digester No1 via M06
- Monitor biogas and oxygen levels
- When gas levels safe, purge gas header to gas holder and surplus gas burner

### **7.4. Phase 4 Commission biogas burner and boiler**

- Purge gas lines to surplus gas burner and boiler
- Commission surplus gas burner by supplier
- Use surplus gas burner to burn low quality biogas with propane
- Use surplus gas burner to burn good quality biogas without propane
- Commission biogas boiler by supplier
- De-commission oil boiler

**7.5. Phase 5 Heating and mixing of Digester No2**

- Close, make safe and block access to digester No2
- Transfer remaining RWBT contents to digester No2 (300m<sup>3</sup>)
- Start Heating when level @16%
- Start hydraulic mixing when level @ 8%
- Start gas mixing when level @ 20%

**7.6. Phase 6 Seeding of Digester No2**

- Remove temporary fill line to digester 1
- Install temporary line from RWBT inlet bypass to digester 2
- Import 1500m<sup>3</sup> of active slurry into digester No2
- Monitor biogas and oxygen levels
- When gas levels are safe open to gas header

**7.7. Phase 7 Processing food waste through the Reception Hall**

- Commission Reception Odour Treatment
- Commission digester recycle line
- Commission shredding line1
- Process food waste into RWBT
- Commission RWBT recycle line
- Commission shredding line 2

**7.8. Phase 8 Feeding of Digester No1**

- When digester No1 temperature at 38°C, start feeding at 20% of design rate
- Ramp feed to design rate over 4 week period

**7.9. Phase 9 Feeding of Digester No2**

- When digester No2 temperature at 38°C, start feeding at 20% of design rate
- Ramp feed to design rate over 4 week period

**7.10. Phase 10 Commission CHP**

- Commission CHP by supplier
- G59 test with DNO by supplier
- Commission CHP heating circuit

**7.11. Phase 11 Pasteurisation system testing**

- Carry out fill and pasteuriser batch

#### **7.12. Phase 12 Screening of pasteurised digestate**

- **Commission Screening Odour Treatment**
- **Start discharge of pasteuriser**
- **Commission screen**
- **Commission transfer pump to storage**

#### **7.13. Phase 13 Tanker discharge from storage tank**

- **Carry out fill of tanker and check flow meter calibration**

## **8. CONSTRUCTION COMPLETION REQUIREMENTS**

- 8.1. This section should be read in conjunction with the Waen commissioning plan ELD document.
- 8.2. Phase 1 cold commissioning
  - Site electrical supply online
  - Plant water available
  - Electrical install to be complete to Digester No1 and M06 pump
  - Pipework to be complete on M06
  - Valves on Digester No1 to be complete
  - Digester No1 gas Mixing Skids to be complete
  - Hot Water header to be complete
  - Digester No1 heat exchanger to be complete slurry and water
  - Air compressor and distribution to local panels to be complete
  - Bund area sumps to be complete
- 8.3. Phase 2 Heating and mixing of Digester No1
  - Temporary line from V033 to V041 fitted with non- return valve
- 8.4. Phase 3 Seeding of digester No1
  - Temporary line from V014 to V041 fitted with non- return valve
  - Gas holder to be complete
  - Gas line to gas holder complete and tested
- 8.5. Phase 4 Commission biogas burner and boiler
  - Gas line to boiler and surplus gas burner complete and tested
  - Surplus gas burner and propane line complete
  - Boiler installation complete
- 8.6. Phase 5 Heating and mixing of Digester No2
  - Temporary hose from V033 to V073 fitted with none return valve
  - Gas mixing system to be complete
  - Hydraulic mixing to be complete
  - Digester No2 heat exchanger to be complete slurry and water
- 8.7. Phase 6 Seeding of Digester No2
  - Temporary hose from V014 to V073 fitted with none return valve
- 8.8. Phase 7 Processing food waste through the Reception Hall
  - Reception hall equipment to be complete
  - Grit tank to RWBT to be complete
  - RWBT to be complete
  - Reception Hall Odour treatment ready

**8.9. Phase 8 Feeding of Digester No1**

- Digester No1 feed system to be complete

**8.10. Phase 9 Feeding of Digester No2**

- Digester No2 feed system to be complete

**8.11. Phase 10 Commission CHP**

- CHP installation complete and oil & glycol filled
- Gas line to CHP complete and tested

**8.12. Phase 11 Pasteurisation system testing**

- Entire system to be complete

**8.13. Phase 12 Screening of pasteurised slurry**

- Entire system to be complete including odour treatment

**8.14. Phase 11 Tanker discharge from storage tank**

- Entire system to be complete

