

GP Biotec Annual Report for Natural Resources Wales

January 26th 2017

Contents

1	Introduction	3
2	CHP Engine Monitoring	3
3	Waste Storage.....	4
2.1	Odour Control.....	4
2.2	Health and Safety	5
4	Biological Process of the AD plant	5
3.2	FOS/TAC and pH	7
5	Waste Return Overview	15
6	Maintenance Overview	16
7	Animal and Plant Health Agency Monitoring (APHA)	16
8	Site Generated Waste	16
	Office/Staff Room Waste	16
	Spent Carbon	16
	Waste Oil	17
9	Water Usage.....	17
10	Dust, Noise & Pest Monitoring.....	17
8.3	Pest Control.....	17
11	Biofertiliser Certification.....	18
12	Spreading Activities and Records	18
13	Community Liaison Activities.....	18
14	Odour Complaints	19
15	Health and Safety	20
16	ISO1400/Green Dragon.....	20

1 Introduction

This report is produced to fulfil the requirements stated in GP Biotecs environmental permit (Permit number EPR/AB3233DW), section 4.2. The report details the performance of the permitted activities carried out by GP Biotec over the previous year (2016) by reviewing the results of the monitoring and assessments carried out in accordance with the permit including an interpretive review of that data.

The report will cover the following areas:

- Engine Monitoring
- Waste Storage
- Biological Process of AD plant
- Waste Return Overview
- Maintenance Overview – Checks
- APHA Monitoring
- Water Usage
- Dust, Noise & Pest Monitoring
- Biofertiliser Certification
- Spreading Activities and Records
- Community Liaison Activities
- Health and Safety
- ISO1400/Green Dragon

2 CHP Engine Monitoring

2.1 Engine Monitoring

There are two Combined Heat and Power (CHP) engines on site, the first engine (an MWM engine) was commissioned in February 2013 and the second engine (MAN engine) was commissioned in March 2015. The engine oil from both engines is monitored and changed regularly – the condition of the oil reflects the condition of the engine. Service Reports, Condition Monitoring Reports and Oil Change records are kept in the Site Office.

Engine checks form part of the daily, weekly, monthly, quarterly, 6 monthly and annual checks and then there are additional services carried out (both by GP Biotec and external companies) - all engine maintenance records are kept in the Site office.

The annual emissions testing was carried out on both the MWM engine and MAN engine on 16th November 2016. Ideally this would have been carried out in June 2016, however there were business related issues over the summer with the company Cooper Ostlund, who supplied the MAN engine, which meant there were delays in being able to organise the testing because there would have been large cost implications if the two engines had to be tested separately. These issues were reported to GP Biotec's NRW Environment Officer (David Willey), who was understanding of the situation and agreed with GP Biotec that the testing would be

carried out before the end of the year. All results were under the emissions limits and will be reported via the PRTR (European Release and Transfer Register) National Data Manager in February 2017. GP Biotec will re-test both engines emissions in November 2017.

2.2 Electricity Production figures

The total generation figure for 2016 was 8,053,218 kW.

2.3 Aardvark Report

The environmental consultancy Aardvark have produced an AD benchmarking dashboard to share with AD operators. The output of the tool is a benchmarking report which enables individual operators to compare various measures of their plants performance against other plants.

It is hoped that through sharing this information it may lead to a better understanding of how best to maximise the efficiencies of AD plants.

The latest report to be published was on the 9th November 2016 GP Biotec is Plant 'E' within the reports. Unfortunately for this round GP Biotec were knocked off the top spot but still scored highly in 4th place.

Amongst other comparisons the report ranks each plant on a scale of 1 - 16 across three variables, income per kW installed, fuel to energy ratio and plant efficiency ratio. They then combine the scores for each of the criteria to give an overall benchmark score.

This issue of the report has shown some emerging trends in the AD sector as they finally see plants commissioned in 2015 coming fully online and producing both heat and electricity which has greatly increased their overall efficiency. Previous issues of the report saw the biomethane plants operating at the highest efficiency levels but this has levelled out somewhat as we see CHP plants able to make use of their available heat.

The full report can be seen in Annex I.

3 Waste Storage

2.1 Odour Control

There have been no odour issues or complaints associated with the blood storage tank since May 2015 when shortly after the installation of the chiller there was a fault with the fan.

Charts to show the temperature of the blood storage tank can be found in Annex II – these illustrate that the temperature of the blood has been kept at around 16°C or below.

2.2 Health and Safety

GP Biotec have a rolling contract in place with Jelf – Risk Management who provide health and safety advice to GP Biotec. There is a traffic light system in place to prioritise the areas which need more urgent attention and currently Jelf risk assessing all procedures related to the plant as part of a wider management document review.

2.3 Site Development

The third and fourth digesters were proposed to be installed in 2016, however financial constraints have held up this next phase of Site development, because investment has been re-directed towards spreading equipment and other infrastructure including the Site Office, education space, plus odour control on digestate storage. It is hoped that a third digester tank will be installed by the end of 2017.

GP Biotec is also planning to install three new carbon filters on site in 2017, to treat the following:

- the existing waste reception building to make the odour control system even more robust;
- the new building which will house the separator and will also link up to control odours from the post-pasteurisation holding tank;
- the new liquid waste storage tanks.

A new solid feeding system is planned as well, to take the pressure off the current system and to provide back up during breakdowns or planned maintenance, this will also have odour control in the form of a carbon filter.

The waste reception area will be tarmacked this year and further waste storage is also planned.

The other major development has been that heat generated by the plant is now being used to heat the Site Office, canteen and new workshop for the affiliated haulage business, GP Services.

4 Biological Process of the AD plant

The biological process is monitored daily, by means of a visual check in the digester tanks which would reveal any significant issues e.g. foaming, as well as a two-weekly FOS/TAC analysis.

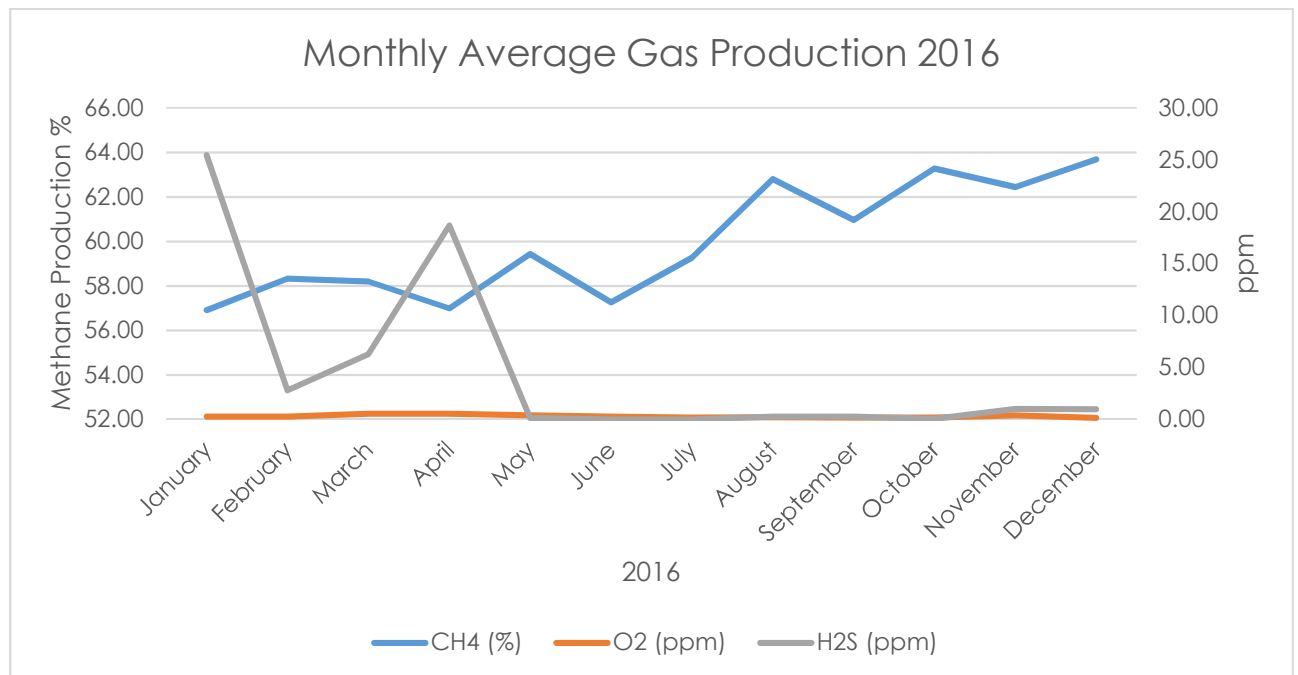
The Digesters have performed consistently well over the past 12 months. The gas production is continually high and the digestate produced has met the PAS110 specification. The information below gives more details of how we measure and monitor the performance of the digesters, including:

- gas production and H₂S concentrations;
- FOS/TAC and pH;
- trace elements;
- temperature and gas pressure;
- ammonia levels;
- concentration of VFAs

3.1 Gas production and Gas H₂S concentrations

Methane production for 2016 has been consistently between 57 – 63% (see Chart 1.1 below) for the year, an indicator that the digesters are performing well. The H₂S level rose on two occasions in 2016, in February and April, in response to this increase the carbon in the engine carbon filter was replaced with fresh carbon. The reason for an increase in April so soon after the change in February was the fact the liquid waste tank had failed to feed during the night of the 24th April and the knock-on effect was a rise in H₂S.

1.1 Monthly Average Gas Production 2016



3.2 FOS/TAC and pH

The pH and alkalinity of Digesters 1 and 2 are monitored monthly, or more frequently if necessary. The pH for both digesters has been consistently at around pH 7.7 – pH 8 which is within the optimal range for the type of AD system at GP Biotec.

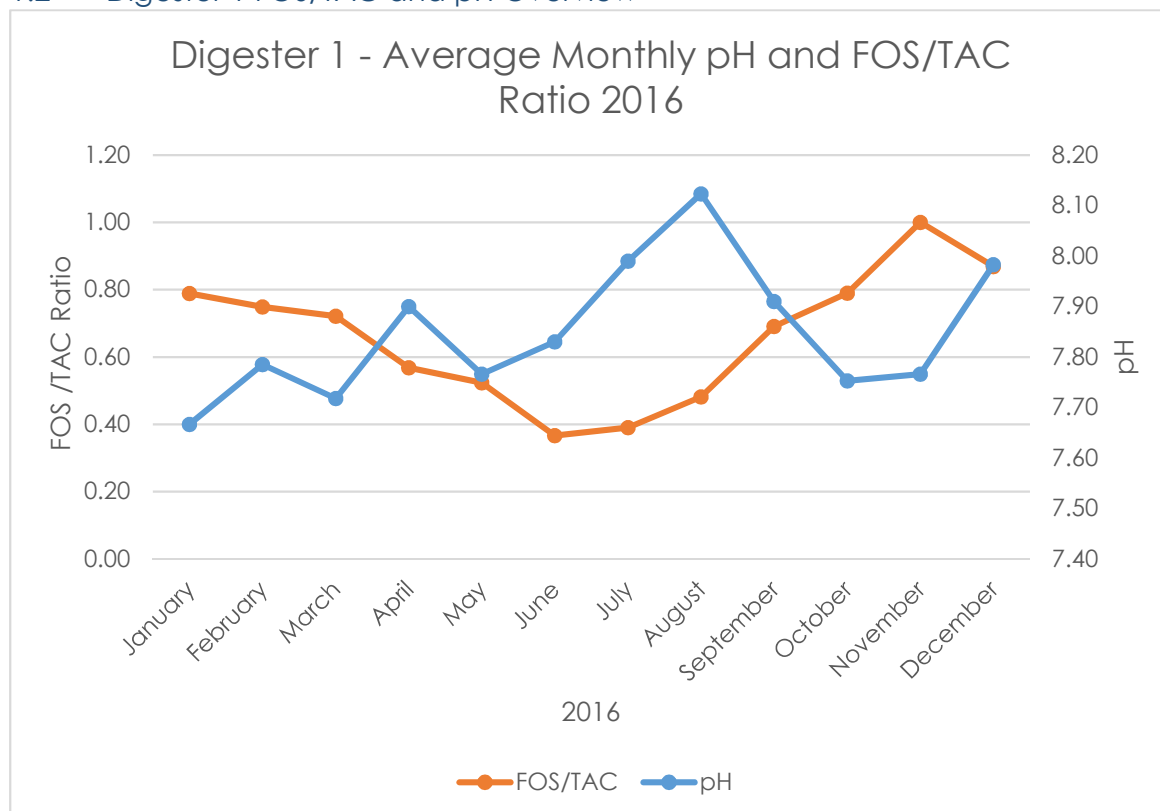
The FOS/TAC in Digester 1 slowly decreased towards the middle of the year and then around September time the FOS/TAC increased quite steeply, from an average of 0.39 in July to 1.0 in November. On the 10th November, the FOS/TAC measured 1.14 in Digester 1 (DG301) which triggered an investigation into the health of the digester, specifically the acids and trace elements in the digester.

As detailed in section '3.3 Trace Elements' below, Biogas Analytix advised that the trace elements within the digesters were all within the optimum range. However, the level of acetic acid in Digester 1 (DG301) was slightly raised, prompting Biogas Analytix to suggest a period recirculating digestate from Digester 2 to Digester 1 to boost the levels of bacteria in Digester 1.

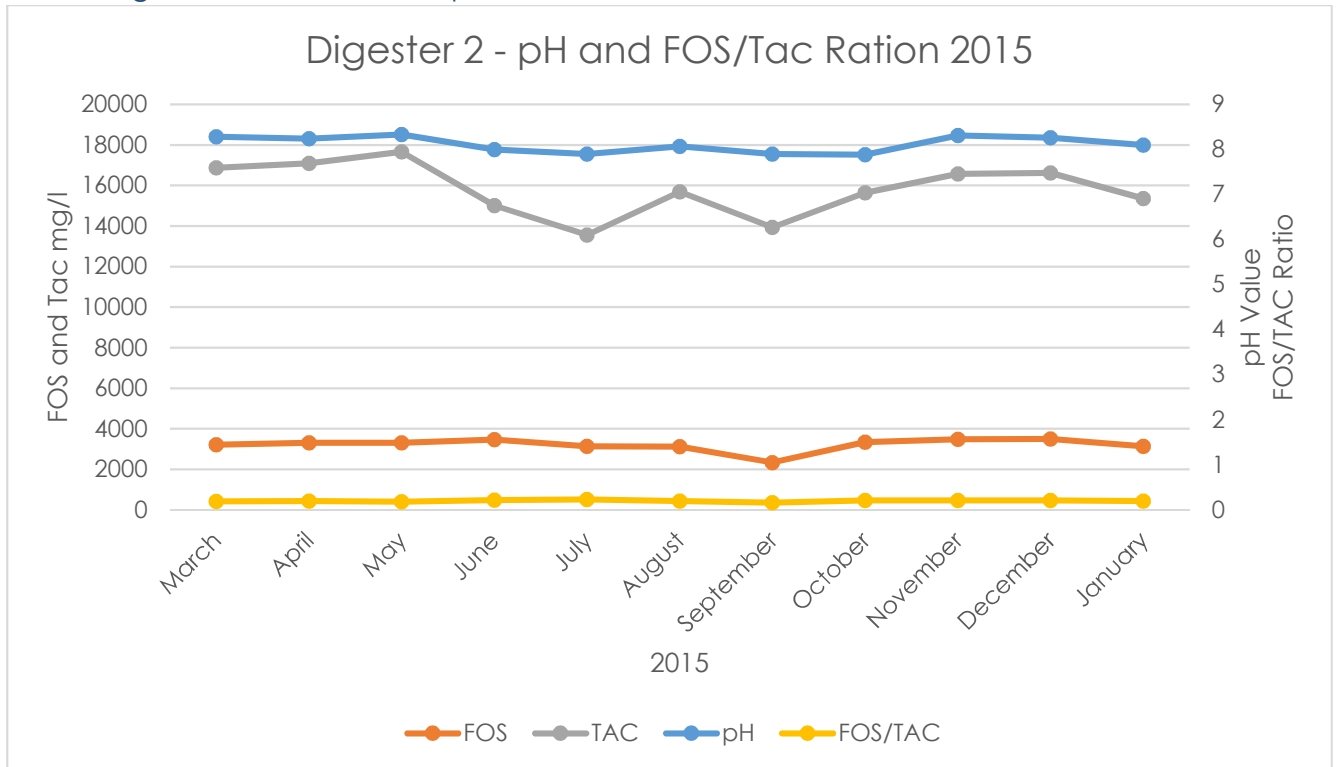
GP Biotec and Biogas Analytix are also considering the possibility that one of the mixers in Digester 1 is not working as efficiently as it should be. Of course, until the roof is removed from the digester tank for maintenance, this possibility cannot be completely investigated.

The FOS/TAC has stabilised and has been on a downward trajectory since November.

1.2 Digester 1 FOS/TAC and pH Overview



1.3 Digester 2 FOS/TAC and pH Overview



3.3 Trace Elements

The trace element levels have been tested twice this year (April and November) in both Digester 1 (DG301) and Digester 2 (DG302). The charts below track the levels of trace elements since testing began in April 2015. The following analysis is derived from commentary and advice given to GP Biotech by Biogas Analytix.

In general, the trace elements are all within the appropriate ranges so the bacteria have good conditions in which to thrive.

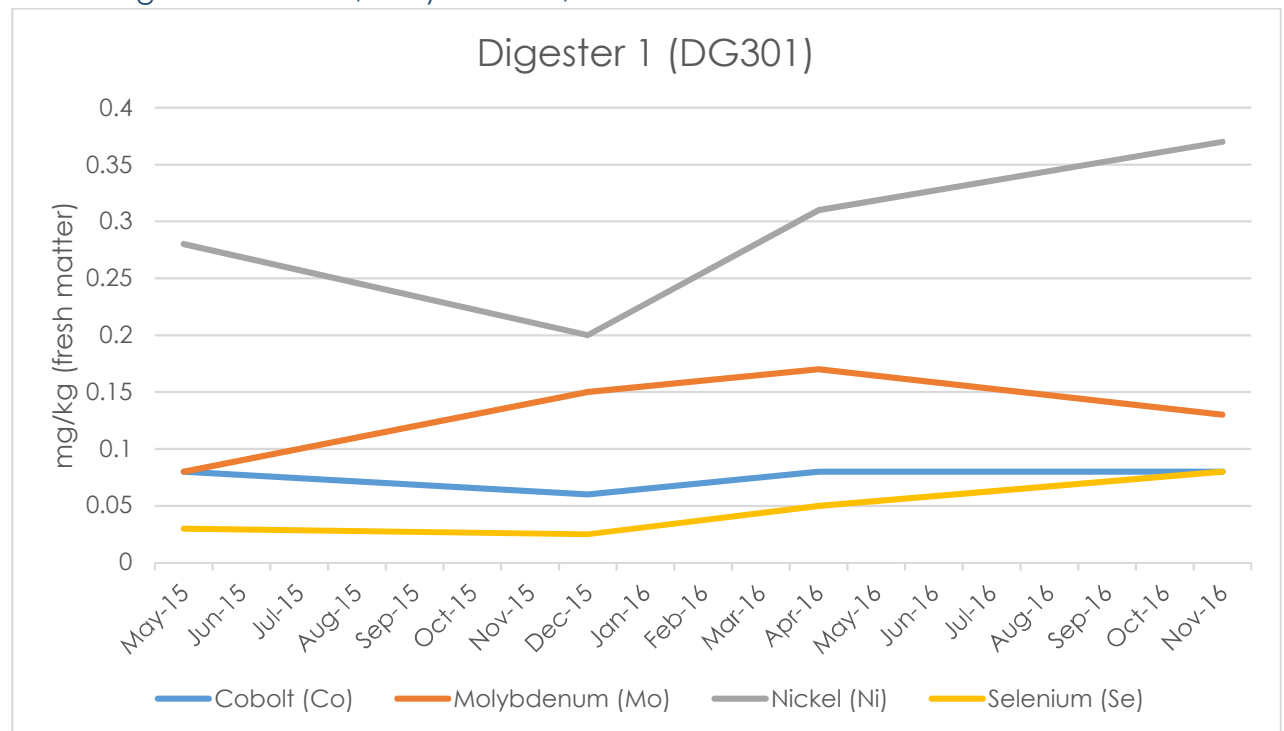
Selenium and Molybdenum

April's analysis showed that selenium and molybdenum were both at the lower end of the minimum levels. However, November's analysis showed a slight increase in selenium in both Digesters, demonstrating that the small amounts of trace element additive that is being mixed into the liquid waste tank is slowly improving the levels of selenium.

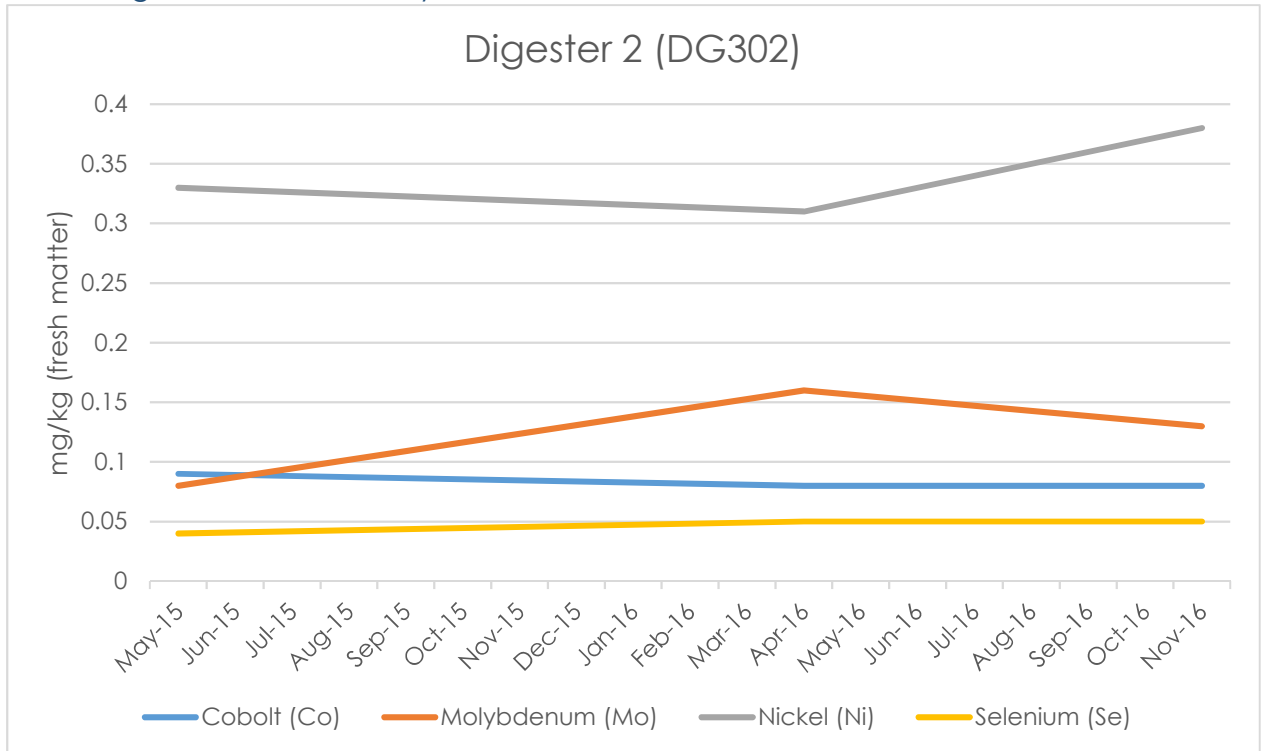
Molybdenum levels remain low and showed a slight decrease between April and November; Biogas Analytix are not overly concerned about this, but have flagged this up as one to monitor moving forward. The health of the digesters will be re-

analysed in April 2017.

1.4 Digester 1 Cobalt, Molybdenum, Nickel and Selenium Trends



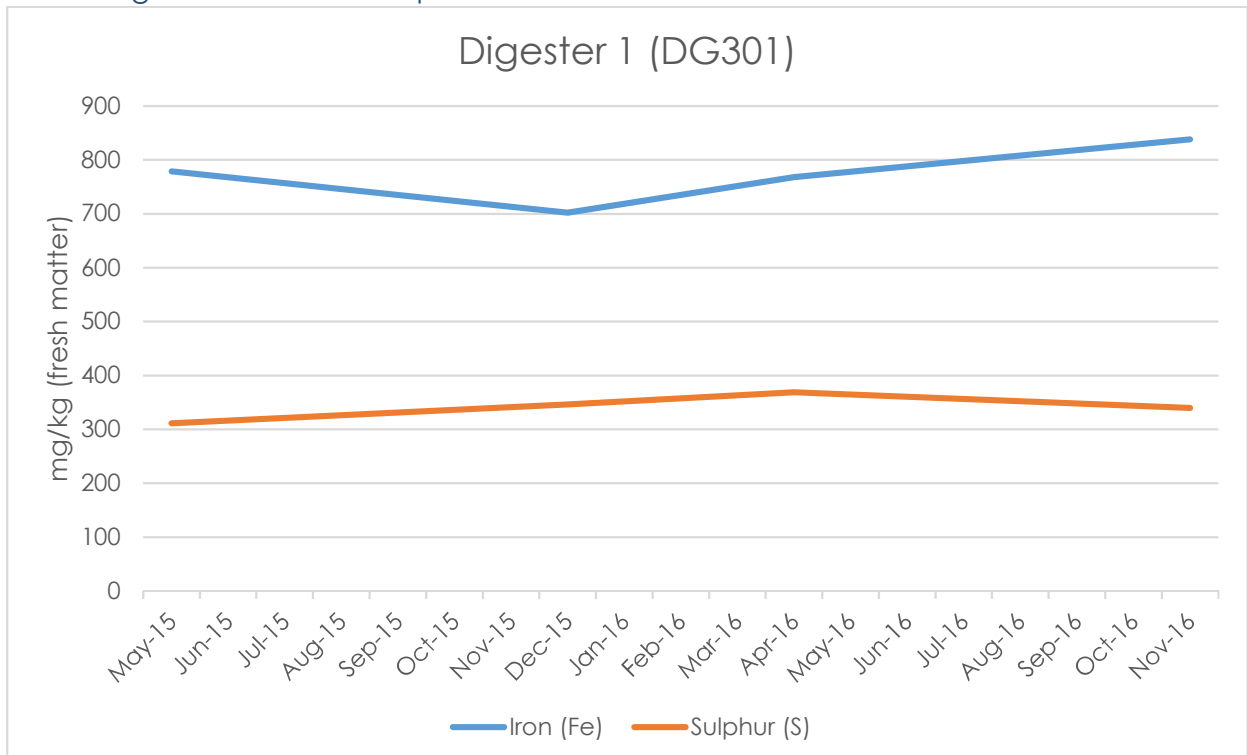
1.5 Digester 2 Cobalt, Molybdenum, Nickel and Selenium Trends



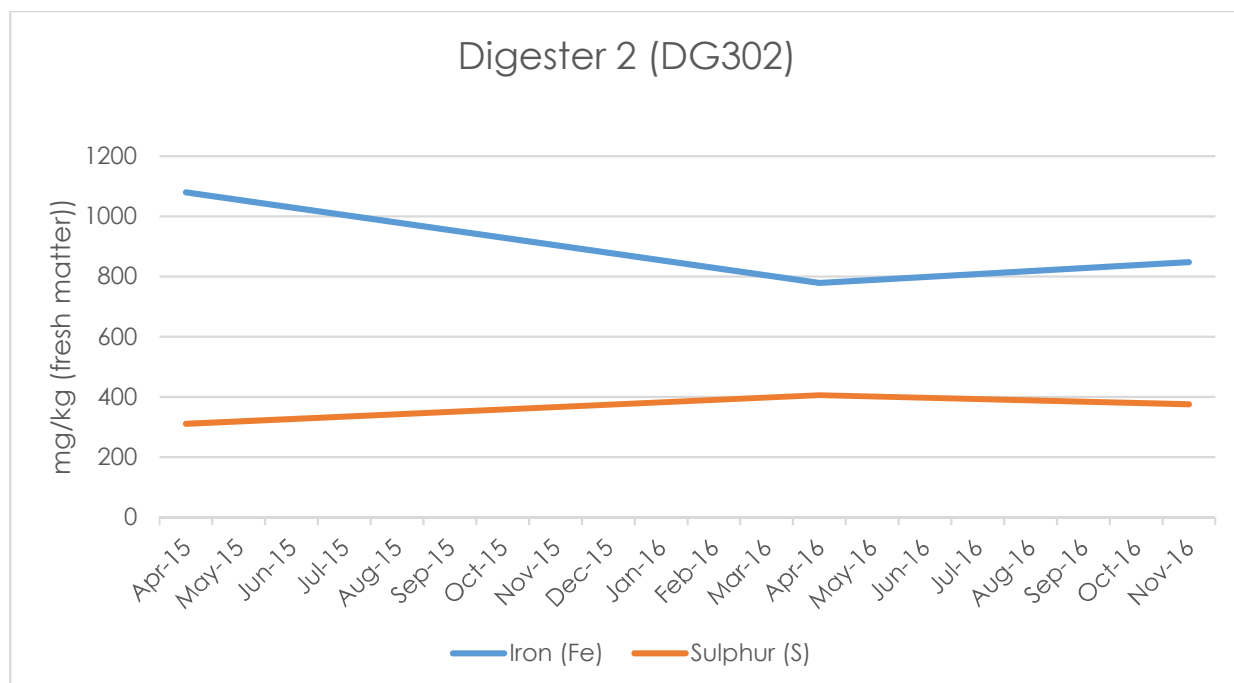
Sulphur/Iron Ratio

The sulphur/iron-ratio is in a perfect range in both Digester 1 and 2. The expected ratio would be 2:1 or smaller, meaning that there should be nearly no H₂S in the biogas and that there is almost no sulphur blocking trace elements that the bacteria require to digest effectively and efficiently.

1.6 Digester 1 Iron and Sulphur Trend



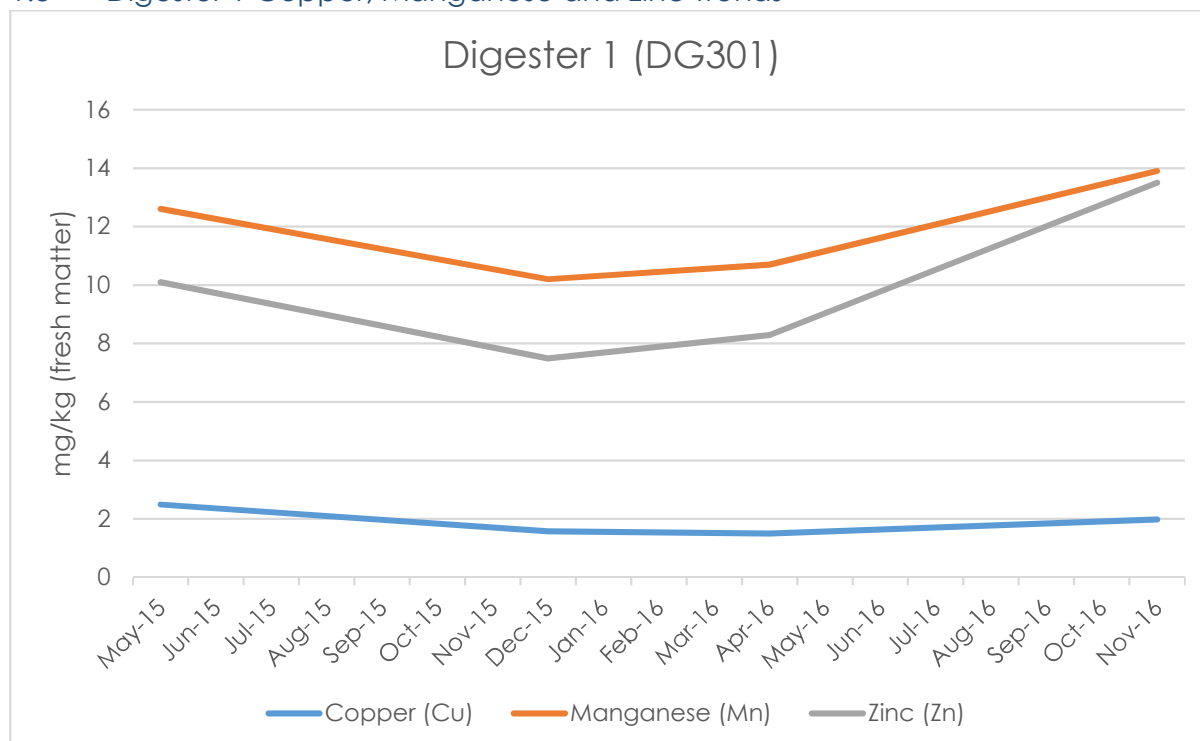
1.7 Digester 2 Iron and Sulphur Trends



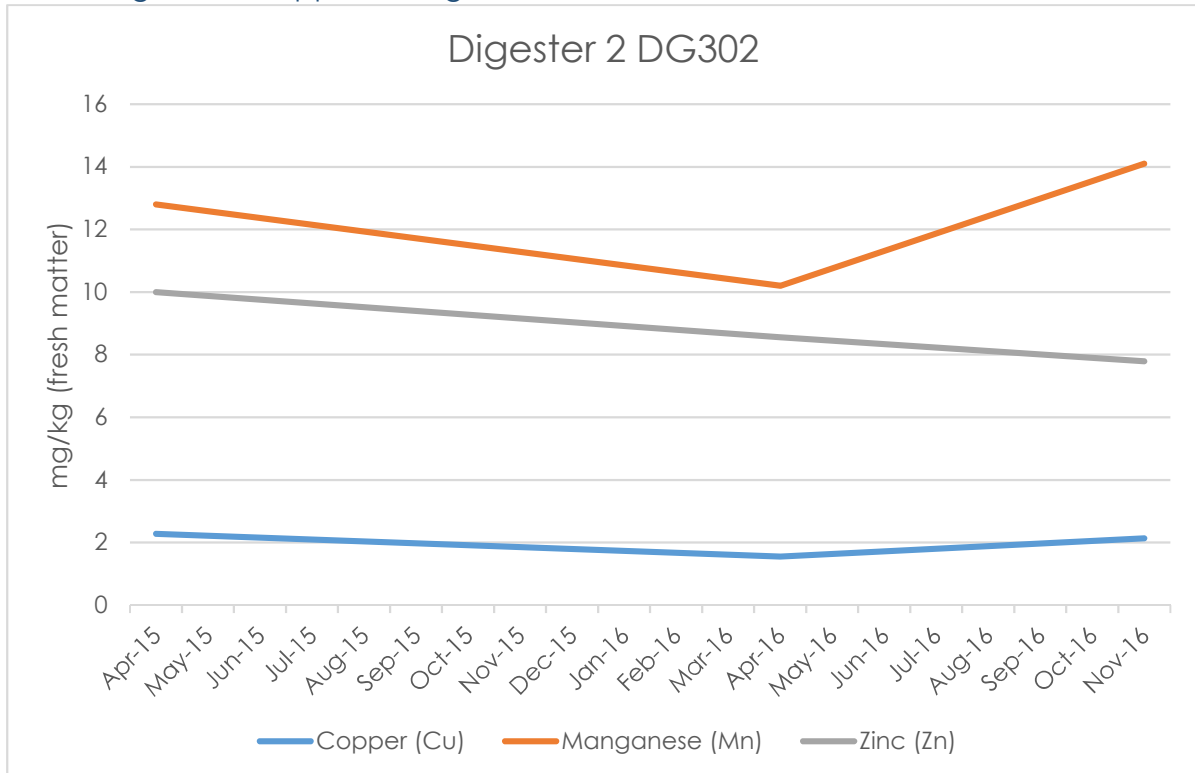
Other Trace Elements

All other trace elements are within the optimum ranges.

1.8 Digester 1 Copper, Manganese and Zinc Trends



1.9 Digester 2 Copper, Manganese and Zinc Trends

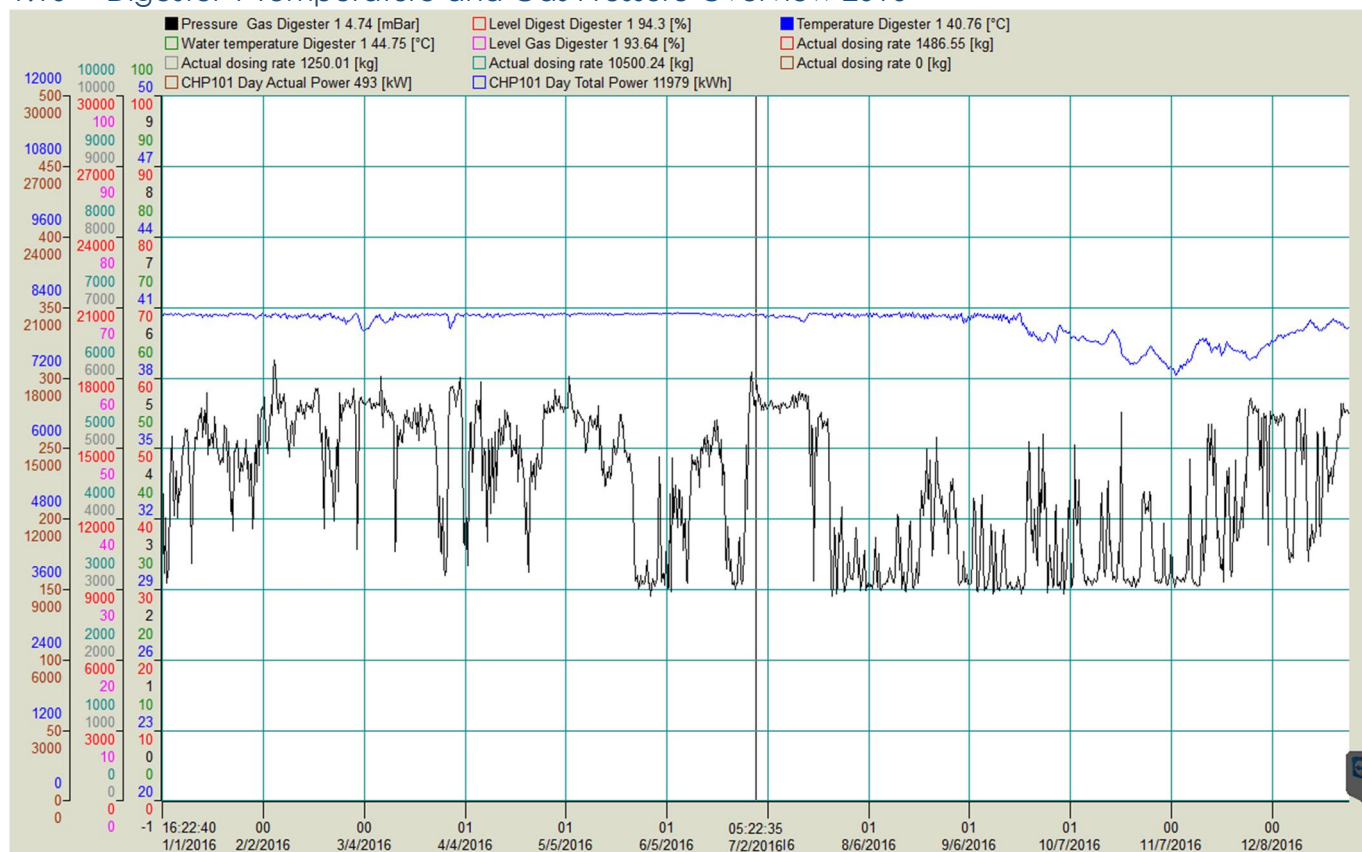


3.4 Temperature and Gas Pressure within the Digesters

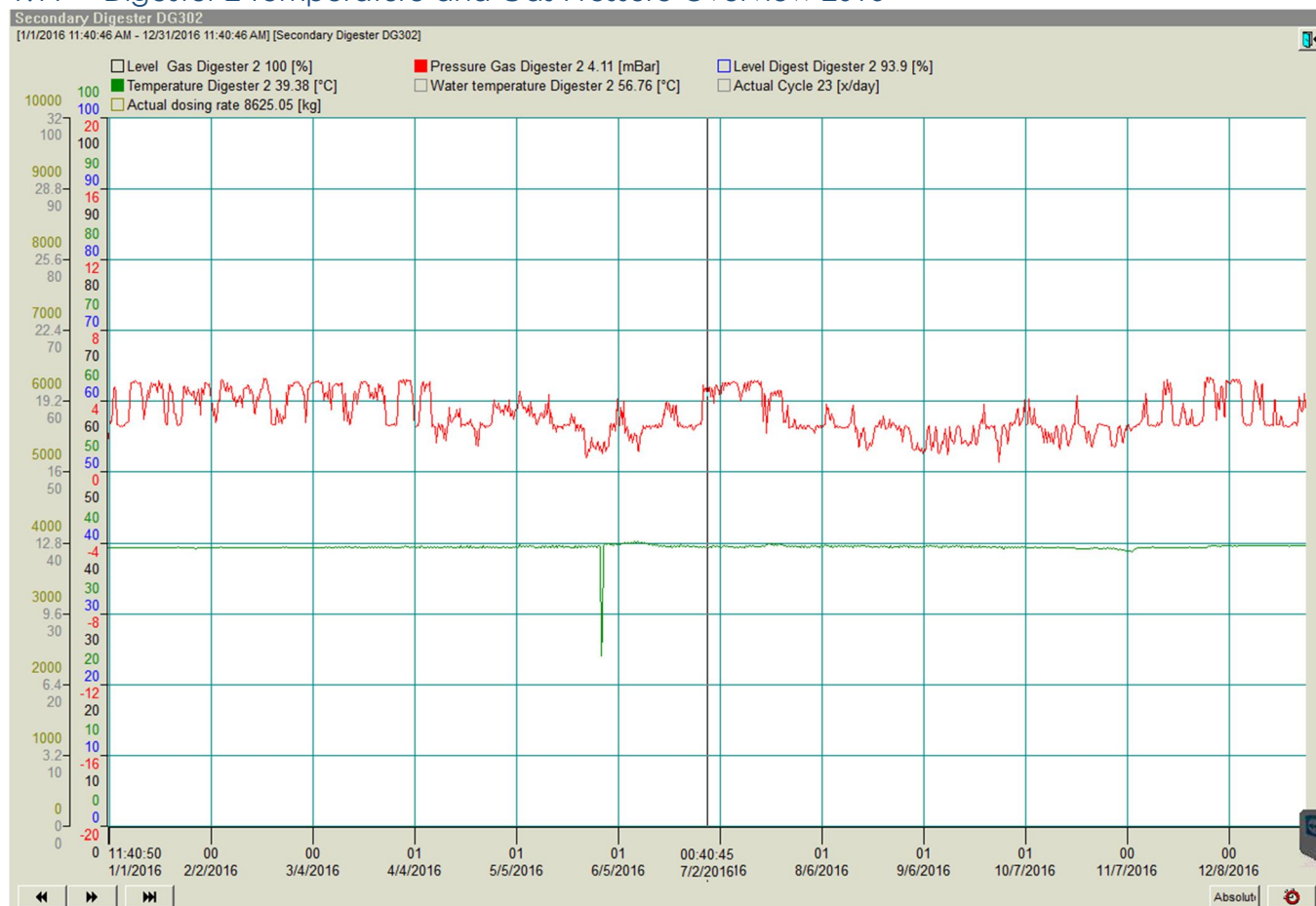
The anaerobic digestion system is mesophilic (about 36-40°C) the charts below show that the temperature of Digester 1 and 2 have been consistently kept at between 38 - 41°C which provides the optimum conditions for mesophilic digestion. The temperature in Digester 1 fluctuated slightly towards the end of 2016, this was due to the heating system struggling to keep up with the high throughput of liquids and the cold weather was also a contributing factor. In previous winters, it's been milder and the materials that were being fed were self-heat generating. The water temperature in the heating system has been increased slightly to balance the system. The charts below illustrate the consistency of the temperatures in each of the digesters (Charts 1.3 and 1.4). The 'blip' in the chart for Digester 2 occurred when maintenance work was carried out on the electronic screen system, so these do not reflect an actual drop in temperature.

The average gas pressure was 4.74 mBar in Digester 1 and 4.11 mBar in Digester 2 for 2016. These values demonstrate that the digestion process is performing consistently well and gas yields are constant.

1.10 Digester 1 Temperature and Gas Pressure Overview 2016



1.11 Digester 2 Temperature and Gas Pressure Overview 2016



3.5 Ammonia (NH₄-N mg/)

The levels of Ammonia within the Digesters remain well below the limit of 6000mg/l which would be the trigger point for an unstable situation in these types of digesters.

The yearly average for Digester 1 was 1912mg/kg and for Digester 2 it was 2994mg/kg.

5 Waste Return Overview

The total amount of waste received on site between October 2015 and October 2016 (the year agreed by GP Biotec and NRW as it was October 2013 when waste was first accepted) was 49,088.01 tonnes. Of the waste received on Site 82.38% is generated in Wales.

In July 2015, the sites permit was updated because of the changes to the Industrial Emissions Directive; at the same time GP Biotec applied for the amount of waste the site was permitted to take to increase from 35,000 to 55,000 – this was granted on 6th July 2015.

Blood Limit

In October 2015 GP Biotec applied to NRW to increase the amount of blood waste accepted to site. GP Biotec proposed the limit on their permit be increased to 30 tonnes per day (it was previously 10 tonnes per day). The blood tank at the site has the capacity to hold 60m³ with the associated bunding capable of holding more than 110% of the largest tank and 25% of the aggregate volumes of the tank farm.

The increase in blood waste would allow flexibility at the site especially during times when there is a large amount of blood waste generated from the slaughterhouses.

NRW granted the amendment to the permit on 12th February 2016. However, there were occasions during 2016 when the 30-tonne limit was exceeded since the variation was issued. GP Biotec explained to NRW that these exceedances have occurred under certain circumstances.

GP Biotec use one driver to collect from Bodmin on a Monday, Wednesday and Friday and on a Tuesday and Thursday the driver collects from Merthyr following the previous day's kills as well as the kill on that day. On some occasions, there is an additional load from Cig Calon Cymru that leads to the total amount of blood received on site exceeding the permitted level.

From the waste returns and the waste data supplied in 2016 for the period January to September the average load accepted per day is 11.9 tonnes, below the 30 tonnes per day limit. Calculations based on the waste returns and input data from GP Biotec for a total of 274 days and a total amount accepted of 3262.28 tonnes.

The issue at the site is one of logistics that enables the business to operate. NRW are reluctant to increase the amount of blood accepted per day but do acknowledge the restrictions the limit has on the day to day business. These exceedances occur when there are not any deliveries (or are small deliveries) the day before or after. The site has the capacity to store up to 60 tonnes of blood with secondary bunding in place. The risk to the environment where the 30 tonnes per day has been exceeded is no more to when the site is within the daily limit.

In the future GP Biotec are to provide details of the blood being fed to the process to demonstrate throughput. In addition, GP Biotec to provide details of how the site undertakes checks for capacity of the storage tank to ensure there is no over filling or unnecessary delays in off-loading the blood to the storage tank. NRW will not score for these breaches of the permit on the assumption that the annual

throughput does not exceed the daily limit when calculated. The logistics at the site should be reviewed on a regular basis in a bid to avoid this situation from occurring. GP Biotec to inform NRW via e-mail of these daily exceedances and review the sites logistics regarding blood collections annually.

NRW carried out a thorough waste audit on 13th September 2016, the results of which can be found in the report Waste Audit EPR-AB3233DW FINAL in Annex III.

6 Maintenance Overview

GP Biotec carries out a variety of regular site checks and has a comprehensive maintenance schedule. Records of these checks and maintenance can be found in the Site Office. A new system of 'zoning' is being introduced having been recommended by the Sites health and safety consultants. GP Biotec is in the process of reorganising the maintenance records and schedule in line with the new Integrated Management Plan. All maintenance records will then be categorised according to which Zone it is in.

7 Animal and Plant Health Agency Monitoring (APHA)

GP Biotec carries out monthly monitoring of *E.coli* and *Salmonella* in samples from the two pasteurisers on site, the results have always come back negative and can be found in Annex IV. APHA carry out quarterly site visits – during which they check various critical control points, including the maintenance of the 12mm cutting screen, vehicle cleaning records, pest control records, pasteurisation records and a spot check on waste transfer notes and weight tickets. All *E.coli* and *Salmonella* samples have always come back negative.

8 Site Generated Waste

Office/Staff Room Waste

GP Biotec has a trade waste contract with Powys County Council for the recycling of paper/cardboard, plastics and general waste – there is a two-weekly collection of 360 litre bin for cardboard/paper, 240 litre bin plastic/can recycling bin and 360 litre bin for general/mixed waste. This covers waste produced by the office and staff room. The contract is kept in the site office.

Spent Carbon

GP Biotec has planned for spent carbon from the carbon filters on site to be collected by Carbon Activated, and if appropriate recycled – details for Carbon activated are held in the site office.

Waste Oil

Waste oil from the engines is collected by an Environment Agency registered company Oil Monster – details of which are held in the site office.

9 Water Usage

GP Biotec is a farm based AD plant and uses water from the farms private water supply. A water meter was put in place towards the end of 2015 and the average daily water use is 0.014m³.

10 Dust, Noise & Pest Monitoring

8.1 Dust

The area surrounding the site has been in a state of flux for the as there is much building and groundworks going on, this often results in a slight increase in the levels of dust but it does not cause any major issues within the site or outside of the site. However, since the completion of the new office/education space and workshop have been completed this has again been significantly reduced. Once the new solid feeder system is in place the yard surrounding the Waste Reception Area will be tarmacked and this will further improve the situation.

Once the third and fourth digesters and all roadways are tarmacked there will be minimal dust.

8.2 Noise

Noise from the activities on site does not cause any issues in terms of pollution off site. Records for readings of noise levels can be found in the site office.

8.3 Pest Control

GP Biotec has an agreement in place with a pest control contractor who visits the site 6 weekly in line with Animal and Plant Health Agency (APHA) requirements, full records of visits and details of control measures can be found in the site office. These records are checked quarterly by the APHA as part of their routine site inspection.

11 Biofertiliser Certification

The whole digestate, and separated fractions (liquor and fibre) continue to be certified under the Biofertiliser Certification Scheme by the Organic Farmers and Growers (See Annex V for a copy of the current certificate). A recertification audit/inspection will take place in March 2017.

12 Spreading Activities and Records

GP Biotec/GP Services continues to increase its available land bank as a priority moving forward to be able to manage the amount of digestate produced. The following information is recorded and stored in the Site Office:

- Signed land management agreements;
- Field numbers and maps;
- Acreage;
- Spreading rate;
- Signed dispatch Digestate (including batch number, in accordance with the Biofertiliser Scheme);

In the last six months GP Biotec's affiliated company GP Services which carries out the spreading of the digestate has been increasing on-site and off-site storage capacity, so that digestate is stored closer to the land where it will be spread.

For a full list of on-site and off-site storage capacity and location see Annex VI.

GP Biotec/GP Services are working closely with NRW to ensure that all storage is WQE3 registered. GP Biotec/GP Services are also working with Farming Connect to ensure that nutrient management plans are in place where digestate is being applied to land managed by GP Biotec/Services. The current aim is that Farming Connect will provide funding and guidance for soil testing (including baseline PTE testing) and nutrient management plans for the farms with which GP Services has Land Management Agreements in place.

13 Community Liaison Activities

The Community Liaison Group (CLG) has been running for two years now. The purpose of the group is to facilitate communication, share information and engage in balanced discussions about any environmental issues arising from GP Biotec's permitted waste recycling and disposal activities regarding GP Biotec's activities at Great Porthamel Farm, Talgarth.

Both GP Biotec and the Group members have found the meetings useful and informative and the general feeling is that a good and open relationship has developed.

In May 2016 the first meeting to be held on Site in the education space took place. It was at this meeting that a Site tour for the members of the group took place. The Group members could ask questions and hopefully gain more of an understanding of the activities on Site.

GP Biotec continues to carry out the following:

- **Dissemination of Information** – Articles in the Town Council Newsletter have helped to get information out into the community, as well as giving information to group members who then pass information on to others;
- **Supporting Local Projects** – GP Biotec donated to the Talgarth Town Twinning Project, covering the shortfall of almost half of the finance required; sponsoring local football team.
- **Spreading Notifications** – GP Biotec continue to keep the locals and NRW informed when they are spreading digestate locally; an email is sent to group members and other relevant parties including NRW to notify them. This notification is also posted on the *fyi:Talgarth* website.

The Agendas and Minutes of all the meetings held in 2016 can be found in Annex VII.

14 Odour Complaints

There were only five instances of odour complaints in 2016.

January 21st 2016

The Community Liaison Group informed GP Biotec of an odour experienced in Talgarth; it was traced back to a tanker of silage pit water being 'blown out' onto a field, which caused a short-term odour. GP Biotec apologised for the issue. This was not to do with the Site directly though.

May 5th 2016

There were a couple of complaints regarding a strong smell of garlic in the centre of Talgarth. A load of garlic was tipped at 7.50am, the driver delivering the waste to site drove through Talgarth, which they know not to do. It's thought that because the garlic waste is picked up with a tractor and trailer and therefore deemed 'farm traffic' that it was acceptable to go through Talgarth, instead of driving around and avoiding the town. All drivers were reminded not to travel through Talgarth when transporting waste via a verbal warning and via the What's App messaging group used on Site. This incident has not been repeated since.

May 5-8th 2016

There were various complaints about a sour odour coming from the Site over a period of around 5 days in May; initially it was thought that the odour may be coming from the recently ploughed fields where because of a very wet Spring the roots of the previous seasons maize crop were rotting and smelling and the ploughing had brought these to the surface and then caused an odour. However, it was eventually concluded that this probably wasn't strong enough to be the cause.

Despite many rounds of odour monitoring and investigations on the farm GP Biotec could not identify the odour as coming from the Site or the farm.

July 26th 2016

There was a complaint from a local resident whose land neighbours land where digestate was being applied. The plan was to apply the digestate to the surface of the land and for a plough to follow the spreading immediately to incorporate the digestate. However, there were issues with the plough and because of the breakdown the digestate was not incorporated until the following morning. The odour created was transient and not persistent and was resolved as soon as the digestate had been incorporated. GP Biotec kept the complainant informed of the situation throughout.

GP Biotec continue to have a dedicated mobile phone that can be used by members of the public to contact them if an odour is detected because of spreading. This phone is manned whilst GP Biotec are spreading. Also, where possible GP Biotec direct inject to ground, this reduces the potential for odour release during these activities.

15 Health and Safety

GP Biotec continue to employ Health and Safety consultants *Jelf Risk Management* to assist in getting all areas of Health and Safety concerning the Site in line with best practice. GP Biotec continue to work steadily through the traffic light system set up in 2015, priorities are currently reviewing all procedures on Site, starting with the highest risk procedures involved in working on the Site under the guidance of Helen Tapley-Taylor from Jelf.

16 ISO1400/Green Dragon

GP Biotec has been reviewing its Standard Operating Procedures, along with the HACCP for the Site, once these reviews are complete an application to the Green Dragon Environmental Standard will be made.