

## IC7

| Emission point reference or source or description of point of measurement | Parameter                           | Monitoring frequency | Monitoring standard or method                                                               | Other specifications                                                                                                                                                                                                                                                         |
|---------------------------------------------------------------------------|-------------------------------------|----------------------|---------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Digester feed                                                             | pH                                  | 3 times per week     | HACH Titrator Serial no 699R066N010                                                         | Acceptable pH 4.000 – 5.999<br><br><b><u>Operational Process Control Parameters</u></b><br><br><b><u>Determination of Alkalinity &amp; pH Procedure</u></b><br><br>Calibration and service of titrator carried out by HACH annually. Last calibrated 16/09/2022.             |
|                                                                           | Alkalinity                          | NIL                  | Method would be to monitor carbonate, bicarbonate and ammonia present in the feed material. | Alkalinity analysis not carried out on feed material as no useful information would be gained, and regularly wouldn't be possible as the materials pH is regularly lower than 5 (the end point required to obtain an alkalinity reading)                                     |
|                                                                           | Hydraulic and organic loading rates | Daily                | OLR = organic material fed (kg) / digester volume (m <sup>3</sup> )                         | <b><u>Plant Monitoring Spreadsheet Procedure</u></b><br><b><u>Operational Process Control Parameters</u></b><br><br>Acceptable OLR 2.5 - 4.999 kg ODM m3 day-1                                                                                                               |
| Digester                                                                  | Operating temperature               | Daily                | SCADA records temperature from temperature probes.                                          | Acceptable 37.1 - 40.4°C<br><br><b><u>Operational Process Control Parameters</u></b><br><br><b><u>Laboratory Monitoring Spreadsheet</u></b><br><br><b><u>Plant Monitoring Spreadsheet Procedure</u></b><br><br>Temperature probes calibrated annually by Status Instruments. |
|                                                                           | Liquid and foam levels              | Continuous           | SCADA control                                                                               | Pressure sensors to determine levels in the digester                                                                                                                                                                                                                         |

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|           | Concentration of ammonia | Monthly          | Calculation using pH, temperature and Ammonium-N results                                                  | Accredited Laboratory – NRM UKAS 2334 and ISO 14001 and ISO 45001                                                                                                                                                                                                                                                                                                                                    |
|           | Concentration of VFAs    | Twice monthly    | External Laboratory – NRM                                                                                 | Accredited Laboratory – NRM UKAS 2334 and ISO 14001 and ISO 45001<br><br>Acceptable < 2,500 mg/l<br><br><b><u>Operational Process Control Parameters</u></b><br><br><b><u>Laboratory Monitoring Spreadsheet</u></b>                                                                                                                                                                                  |
|           | Alkalinity               | 3 times per week | H2SO4 0.1N added to a sample of digester contents and measure volume of acid added until pH falls to 5.75 | <b><u>Determination of Alkalinity &amp; pH Procedure</u></b><br><br><b><u>Laboratory Monitoring Spreadsheet</u></b><br><br>Calibration and service of titrator carried out by HACH annually. Last calibrated 16/09/2022                                                                                                                                                                              |
|           | FOS/TAC ratio (VFA/TA)   | 3 times per week | Alternative analysis method used – alkalinity ratio                                                       | See explanation below for information regarding alkalinity ratio analysis<br><br>Acceptable 0.200 – 0.499<br><br><b><u>Operational Process Control Parameters</u></b><br><br><b><u>Laboratory Monitoring Spreadsheet</u></b><br><br><b><u>Determination of Alkalinity &amp; pH Procedure</u></b><br><br>Calibration and service of titrator carried out by HACH annually. Last calibrated 16/09/2022 |
|           | pH                       | 3 times per week | HACH Titrator Serial no 699R066N010                                                                       | Acceptable pH ≥ 7.00<br><br><b><u>Operational Process Control Parameters</u></b><br><br><b><u>Laboratory Monitoring Spreadsheet</u></b><br><br><b><u>Determination of Alkalinity &amp; pH Procedure</u></b><br><br>Calibration and service of titrator carried out by HACH annually. Last calibrated 16/09/2022                                                                                      |
| Digestate | Concentration of VFAs    | Monthly          | External Laboratory - NRM                                                                                 | Accredited Laboratory – NRM UKAS 2334 and ISO 14001 and ISO 45001                                                                                                                                                                                                                                                                                                                                    |

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|                                                                                                | Ammonia                           | Monthly          | Calculation using pH, temperature and Ammonium N results                  | Records maintained in the site Plant Monitoring Spreadsheet<br><br><b><u>Plant Monitoring Spreadsheet Procedure</u></b><br><br>Accredited Laboratory – Eurofins Food Testing ATL Ltd UKAS 2262; Accredited to ISO/IEC 17025:2017                                                                                                                                                                                                                                                                                                                                                      |
| Biogas from digesters                                                                          | Flow                              | Continuous       | SCADA                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                                                                                | Quantity                          | Continuous       | SCADA                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                                                                                | Pressure                          | Continuous       | SCADA                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                                                                                | Composition                       | Continuous       | Awite Gas Analyser 1769                                                   | Gas Analyser Serviced by Allison Engineering Ltd                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                                                                                | Methane                           | Continuous       | Awite Gas Analyser 1769                                                   | Gas Analyser Serviced by Allison Engineering Ltd                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                                                                                | Hydrogen Sulphide                 | 3 times per week | H <sub>2</sub> S RAE tube readings are taken from the gas sampling point. | Acceptable <300ppm<br><br><b><u>Operational Process Control Parameters</u></b><br><br><b><u>Plant Monitoring Spreadsheet Procedure</u></b>                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                                                                                                | Carbon Dioxide                    | Continuous       | Awite Gas Analyser 1769                                                   | Gas Analyser Serviced by Allison Engineering Ltd                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Biogas from digesting tank, biogas holder, waste reception building and external storage areas | Odour                             | Daily            | Olfactory Monitoring                                                      | Odour detection at site boundary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Bund sump and storm water inspection chambers                                                  | Oil/grease and ammonia no >0.3ppm | Weekly           | Instantaneous ammonia reading using CHEMetrics ammonia test kit.          | The CHEMetrics Ammonia test kit employs the well-established Nessler reagent to determine ammonia concentrations are applicable to drinking water, clean surface water, good-quality nitrified wastewater effluent, and sea-water testing. Prior to any discharge from the front apron, a test is undertaken to ensure the water does not exceed 0.3ppm. In the event it exceeds it is returned back to the process for full treatment through the AD process where it ultimately then forms part of the PAS 110 digestate. A visual check is undertaken for any signs of oil/grease. |

**Alkalinity Ratio Analysis**

Alkalinity and acidity are monitored by carrying out alkalinity analysis using a auto-titrator. Method used by Biogen as an alternative to FOS/TAC analysis:

- To determine alkalinity (also called partial alkalinity) – add  $\text{H}_2\text{SO}_4$  0.1N to a sample of digester contents and measure volume of acid added until pH falls to 5.75
- To determine acidity (also called intermediate alkalinity) – continue to add  $\text{H}_2\text{SO}_4$  0.1N to the same digester contents sample, until pH falls to 4.3
- Alkalinity ratio = Intermediate alkalinity / Partial alkalinity