DURANTA TEESSIDE LIMITED
TANK INTERNAL INSPECTION FREQUENCY
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Risk Based Proposal

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1.1. Introduction and Background

1.1.1. Duranta Teesside Limited operates a Biogas AD facility located at Forty Foot Road, Middlesbrough, Teesside, TS2 1HG, site grid reference: 448885 (Easting), 521091 (Northing). The site operates according to environmental permit reference EPR/YP3236RW. The process is a two-step mesophyllic anaerobic digestion process, designed to process up to 157,000tpa of bio wastes including food wastes and Cat 3 ABP.

1.1.2. Table S3.3 of the permit requires that all tanks at the site that are over 600m^3 in volume must be subject to internal visual assessment by a suitably qualified structural engineer after 5 years from the end of commissioning and then subsequently every 3 years.

1.1.3. The requirement for internal tank inspection on a three yearly basis is not routinely applied to all AD operations subject to environmental permitting. It is believed to have been specified as a requirement on initial permit issue on the basis of a risk based precautionary approach because the secondary containment measures at the site are not those considered as standard at many AD plants. Site surface water and/or spillages are collected in a sump which drains to a 100m^3 below ground tank which then in turn pumps automatically to an 8068m^3 storage tank. This storage tank is maintained as 'empty' during normal operations so as to ensure sufficient containment capacity is always available. The requirement was also added to the permit prior to implementation of current appropriate measures guidance based on latest industry Best Available Techniques (BAT).

1.1.4. In accordance with the permit requirement, the operator commissioned internal inspections of Fermenter 1 (tank no. BE1), Fermenter 2 (tank no. BE2), and the Post Fermenter (tank no. BE3) which were undertaken in the autumn of 2021. Internal inspection was carried out by specialist contractor Hayes GFS Limited. Hayes GFS Limited have over 20 years of experience in the water industry and specialise in the installation, assessment, and refurbishment of glass-fused-to-steel tanks. As such the company was considered suitably competent to undertake a detailed and independent assessment of the tank's integrity. They were also considered competent to

carry out and/or inspect and verify the success of any repair works that might be identified as needed during the inspection.

1.1.5. Hayes GFS Limited carried out an internal and external low level visual inspection, wet swap testing of glass coated steel panels and high-level internal inspection following prior emptying and cleaning of the tanks. The outcome of all three tank assessments was documented in report reference HGFS Ref. Q2367A, final issue 11.04.22.

1.1.6. In summary, the tanks were found to be' in very good condition for their age'. Internal coatings were found to be in 'excellent condition', with only one localised area of coating damage in the same place on all three tanks, directly above the inlet connection on each tank. A specialist coating repair company was engaged to carry out the required repairs to all these areas; the repairs were inspected by Hayes GFS Limited and deemed to be satisfactory on completion.

1.1.7. Tank wall panel joins were found to be intact and effective.

1.1.8. All three tanks were originally installed with sacrificial anodes, the majority of which (80%) was found to have been eroded away (as intended when installing a sacrificial anode). All of the anodes were replaced with new ones.

1.1.9. Some minor corrosion was found externally on Fermenter 1 due to standing water around the outside of the tank. The corrosion was repaired and treated, and measures applied to ensure the area is free draining to avoid recurrence of the issue.

1.1.10. Ancillary items, connections, tank bases and heating rings were all found to be in a good state of repair.

1.1.11. Repeat internal inspection was recommended within 5 years. Individual tank inspection dates were as follows;

- Fermenter 1 – August – September 2021
- Fermenter 2 – October – November 2021
- Post Fermenter – September – October 2021

1.2. Future Inspections Risk Based Approach Proposal

1.2.1. In the autumn of this year (2024) it will be three years since the last internal tank inspections were undertaken and according to the site permit the next internal tank inspections will be due at that time.

1.2.2. To undertake internal tank inspections, the operator must plan well ahead of time as to how tanks will be drained down and taken out of commission to allow cleaning and internal inspection to occur. This process is complex, and there are significant environmental and health and safety risk that need to be managed throughout the process.

1.2.3. The process also imposes significant costs to the business arising from plant downtime and securing of resources needed for the exercise.

1.2.4. Given the risk and costs involved in the process, the operator has undertaken a review of the frequency of internal tank inspection exercises to assess whether the three-year frequency requirement is proportionate to the costs and benefits/risk that are apparent at the current time. The last tank internal inspection cost the operator between £150-180,000 per tank.

1.2.5. It is the operator's view that it is reasonable and proportionate to propose that the tanks are next drained down and opened for internal inspection 5 years after the date of the last inspection (autumn 2026) rather than 3 years after the last inspection (autumn 2024). This is in view of a number of factors, including the recommendations following the most recent assessment and various other measures in place at the site to minimise risk of loss of containment. The various measures in place that minimise risk are outlined in the next section.

1.3. Review of Risk Factors and Best Available Techniques

1.3.1. The last tank internal inspection was carried out in the autumn of 2021. Although the permit requirement is that the first inspection was to be carried out 5 years after completion of commissioning, there was a delay to the first internal inspection being carried out due to Covid 19 disruption to services. The tanks were first opened for inspection 7 years after first permit issue (October 2014) and 6 years after completion of site commissioning. The tanks were found to be in a good state of repair despite the delay in timing of inspection. The fact that there is evidence to show that the tanks were seen to be in a good state of repair even with a delay to the initial 5-year inspection supports the operator's findings that a 5-year interval between subsequent inspections is reasonable and proportionate.

1.3.2. Hayes GFS Limited recommend that the tanks are opened within 5 years of the last inspection based on their detailed internal inspection of the tank and knowledge of the corrective works undertaken, again providing evidence from informed and independent specialists opinion that a 5-year period between inspections is proportionate to the risk.

1.3.3. Section 1.6 of Ciria 736 states that 'Fire is the most common cause of serious pollution incidents. A relatively small proportion of incidents stem directly from the catastrophic failure of tanks or vessels. On site traffic movements and loading movements are also a regular cause of incidents involving rupture of tanks, drums, vessels, bunds, or pipework. For smaller sites vandalism is of increasing concern.'

1.3.4. The Duranta site has a range of measures in place that minimise the risks of pollution arising from these most common causes of incidents (fire, vehicle movements, loading operations, and vandalism) which are specified in the site accident management plan. The site is subject to a regular fire risk assessment, and DSEAR assessment which identify different risk zones across the site where activities need to be managed according to specific risk, and measures to minimise the risk of fire occurring. Activities at the site are controlled according to a 'permits to work' system including issuing of hot works permits, and all staff and contractors are subject to site specific induction and training for site rules.

1.3.5. The main process tanks are located in an area that is not subject to routine movement of vehicles and as such the tanks are at minimal risk from vehicle collision damage.

1.3.6. There are a range of security measures at the site, including CCTV, fencing, intruder alarms, and visits from onsite security 3 times per night which minimise the risk to operations from vandalism.

1.3.7. The tanks concerned are fermenters which are loaded by in situ fixed pumps and sealed pipework and so there is a minimal risk of damage arising from these low-risk loading methods. Tanks are fitted with a series of high-level monitoring probes and pressure relief systems to ensure that level and pressure are monitored and managed by the SCADA control system. The site has also been designed according to the HAZOP process which is intended to 'engineer out' risk during the design and construction phase.

1.3.8. The Ciria 736 standard does not address recommendations for primary containment but does provide a reference for where good practice guidance for the design, manufacture, installation, operation inspection and maintenance of chemical storage systems can be found, and reference is made to 'Cassie and Seale 2003'.

1.3.9. The document that is referenced here is CIRIA publication (C598), Chemical storage tank systems – good practice (RP658) which provides detailed guidance on good practice in the design, manufacture, installation, operation, inspection, and maintenance of tank systems (S Cassie, L Seale 2003). A good practice checklist based on this guidance has been published,

reference ‘Chemical storage tank systems –checklists (CIRIA publication W003)’ and the same checklist is included as an appendix to the full guidance document. These measures largely mirror the measures specified in EA guidance ‘Appropriate Measures for Biological Treatment of Waste’ Section 7.7 Tank Inspection and Maintenance and 7.1 Above Ground Tank and Bulk Storage at www.gov.

1.3.10. Section 6 of the checklist relates to operations, ‘inspection, and maintenance’, and addresses a range of areas such as maintenance and inspection, management of deliveries, permits to work systems, health and safety considerations, tank alarm systems and systems of control, emergency planning, pipework inspection and general maintenance and calibration of instrumentation.

1.3.11. The operator has carried out a review of the measures in place at the sites in accordance with this best practice checklist for inspection and maintenance and the EA appropriate measures guidance. The site EMS makes facility where relevant for the measures identified in the checklist and the operator can demonstrate that the measures are addressed in the site EMS and that the inspection and maintenance measures are therefore in accordance with good practice. The operator retains an up-to-date P&ID showing all process instrumentation controls and equipment.

1.3.12. The checklist recommends that internal tank inspections are carried out according to a risk-based approach and similarly no minimum frequency for internal tank inspection is specified in the EA appropriate measures guidance on tank inspection and maintenance and above ground tank and bulk storage.

1.3.13. It is noted that the minimum frequency specified in standard rules permits for AD waste installations for integrity testing is 5 yearly and that the requirement is as follows;

- ‘from the date of commission inspect the tank and carry out a non-destructive pressure testing integrity assessment 5 yearly or as specified by the manufacturers technical specification, whichever is more frequent’

1.3.14. The requirement specified in a recent bespoke waste AD installation permit issued following implementation of new best available techniques in the final permit and at the application assessment stage includes the following requirement;

- Tank capacity and sedimentation assessment – once every five years from date of commissioning - Non-destructive pressure testing integrity assessment every 5 years or as specified by manufacturers technical specification.

1.3.15. In both of these instances the minimum frequency of inspection required is every 5 years, but there is no specific requirement for the tanks to be assessed for integrity by drain down and internal visual assessment as required in the Duranta permit.

1.4. Summary, Conclusions and Proposal for Consideration

1.4.1. The operator has commissioned specialist internal inspection of Fermenter 1, Fermenter 2, and the Post Fermenter in the autumn of 2021.

1.4.2. The tanks were found to be generally in a good state of repair with some minimal corrective works needed. These works were all completed and verified to standard before the tanks went back into commission.

1.4.3. Based on the findings of the last internal inspection, the specialist contractor that undertook the inspection has recommended that the next internal inspection take place within the next 5 years.

1.4.4. The operator considers that there is reasonable evidence to support the fact that the next internal inspection can be carried out 5 years after the last (autumn 2026) without this substantially increasing the risk of loss of containment from the tanks.

1.4.5. The operator can demonstrate that best practice measures are implemented at the site in accordance with those specified by the EA ‘Appropriate Measures’ guidance and Ciria 598 which is also referenced in Ciria 736 with respect to best practice for primary containment systems.

1.4.6. The operator can demonstrate that measures are in place to address the more common causes of pollution incidents as specified by Ciria 736 (fire, loading operations, vehicle collisions, and vandalism).

1.4.7. Available guidance states that tank inspections should be carried out according to a risk-based approach.

1.4.8. Current standard rules and bespoke AD waste installation permits specify a minimum frequency of every 5 years for digester tank integrity inspections but do not specify internal visual inspection as the methodology for such assessments. As such the proposal to open the tanks for visual inspection every 5 years rather than every 3 years still constitutes a precautionary and robust approach in the context of wider industry practice.

1.4.9. The operator has concluded that the costs, disruption to operations, and need to manage risk to the environment and staff arising from opening the tanks at a routine frequency of three yearly is disproportionate to the risks posed by potential tank catastrophic failure at the site given the range of measures in place. Five yearly assessments are considered proportionate and sufficient to manage risk without imposing undue burden on the project. This is based on the current context and objective information available.

1.4.10. The operator therefore proposes the following;

1. That the next internal inspection of Fermenter 1, Fermenter 2, and the Post Fermenter at the Duranta Teesside Limited AD site can take place in autumn 2026 as a proportionate and reasonable time frame for inspection based on the information provided.

2. That following the inspection proposed for 2026, the operator will undertake to submit the findings of the inspection report to the EA and agree with them the timing of the next inspection based on the risk factors and regulatory context apparent at that time and recommendations of the tank inspection company following the inspections.

1.7 Abbreviations

Abbreviation	Description
ABPR	Animal By-Products Regulations
AD	Anaerobic Digestion
ATEX	Abbreviation for the ATEX Directive and is short for "Atmospheres Explosibles"
BAT	Best Available Techniques
CCTV	Closed-Circuit Television
CHP	Combined Heat and Power (Engine)
COGAP	Code of Good Agricultural Practice
DSEAR	Dangerous Substances and Explosive Atmospheres Regulations 2002
DM	Dry Matter
EA	Environment Agency
EP	Environmental Permit
HAZOP	Hazard and Operability Study
IBC	Intermediate Bulk Container
LNR	Local Nature Reserve
LWS	Local Wildlife Site
P&ID	Process and Instrumentation Diagram
PAS110	Publicly Available Standard for the production of quality digestate
Ramsar	Ramsar Site (a wetland site designated to be of international importance under the Ramsar Convention 1971)
SAC	Special Area of Conservation
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
WHO	World Health Organisation

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