Appendix M - Basingstoke STC Liquor Proposal

Commitment

Thames Water commits to undertaking (using a UKAS accredited laboratory or equivalent - where available):

a) chemical analysis of the waste water which tests for ALL pollutants which we expect to find in the discharge (not just Ammonia, BOD, Solids, flow, pH and data on bio-eliminability) and that we will use an appropriate 'minimum reporting value' (MRV) (usually 10% of the environmental quality standards (EQS) where this is analytically achievable); and

b) the sampling and chemical analysis being undertaken in line with guidance Surface water pollution risk assessment for your environmental permit – GOV.UK (www.gov.uk) for all pollutants we expect to find.

Liquor Monitoring Proposal

TWUL are committed to providing information about the characteristics of the wastewater streams at Basingstoke and are undertaking a review of our commitment to BAT 3, 6 and 7 further details of which are set out below.

Our review includes, but is not limited to, requesting companies providing national laboratory services to provide information relating to their capacity to analyse return liquor matrix for the determinants listed in the guidance.

Such information is essential in order for us to complete the review of our current Liquor monitoring proposal and delivery of BAT 3, 6, and 7. We plan to complete this at the earliest opportunity and at the point of writing these enquires remain open with each of the laboratories.

We will provide and updated proposal to the Environment Agency in line with a revised IED programme and in the meantime, we would like to assure you of our commitment to sample liquor returns at Basingstoke, our commitment to BAT 3, 6, and 7 and the following:

a) Summary of the sampling and analysis methodology of the effluent discharged and likely pollutants in the effluent (Guidance Monitoring discharges to water: guidance on selecting a monitoring approach - GOV.UK and Surface water pollution risk assessment for your environmental permit - GOV.UK*).*

Under the BREF guidance Best Available Techniques (BAT) conclusion 3 Thames Water will establish and maintain an inventory of waste water and waste gas streams. Thames Water will carry out the sampling and analysis methodology of the effluent discharged at defined and recorded locations. All Thames Water staff involved in the sampling, analysis and reporting will be trained personnel, accredited to the Environment Agency's (EA) Monitoring Certification Scheme (MCERTS) standards or appropriate alternatives. Thames Water will ensure to document sampling procedures with details such as:

- precise location of the discharge sampling point including a grid reference.
- sampling process.
- storage conditions and transport of samples.
- types of bottles or containers and their closures.

A management system will be used to ensure the results are recorded and subject to review to include, but not be limited to, the following procedures:

- sampling programme, including procedures for resampling.
- data review and reporting
- training and audit.

b) A written statement with a commitment to undertake the sampling and analysis in line with BAT3.

The purpose of BAT3 in relation to return liquors is to establish and maintain an inventory of wastewater streams, as part of the environmental management system, to facilitate the reduction of emissions to water. In accordance with BAT3 the following data will be provided:

i. Simplified process flow sheets that show the origin of the emissions. Flow calculation based on an assessment of throughput may be used.

ii. Descriptions of process-integrated techniques and wastewater treatment at source including their performances. Chemicals used for thickening and dewatering should also be stated.

iii. Thickening and dewatering liquors, which comprise the major component of the returns, will be subject to monitoring for: Ammonia; BOD; solids; flow and pH.

iv. Data on bio-eliminability (e.g. BOD)

Thames Water is committed to providing information about the characteristics of the identified liquor return sampling points, namely average values and variability of calculated daily flows. In addition, Thames Water is committed to further undertake the sampling and analysis of ammonia, BOD, solids and pH.

c) A written statement with a commitment that those undertaking the sampling and analysis will be by accredited to MCERTs or provide evidence of equivalent standards.

Thames Water is committed to perform sampling and analysis in accordance with MCERTS or ISO/IEC 17025.

The chemical analysis of the effluent and liquor return samples will be analysed in a United Kingdom Accreditation Service (UKAS) accredited laboratory – where available.

d) A plan which identifies the effluent sampling point(s) and emission point for the effluent discharge from the installation and the NGR of the effluent sampling point/s

Thames Water has identified process/drainage lines, at Basingstoke STW, which return liquors and wastewater from the sludge treatment area to the head of works. The primary wastewater streams identified as follows:

- Picket Fence Thickener liquors
- SAS Thickening Liquors
- Pre-THP Dewatering Liquors
- Digested Sludge Dewatering Liquors
- Biogas Condensate
- OCU Waste Waters
- Boiler Waste Waters
- Reverse Osmosis Plant Waste Waters
- Liquor Buffer Tank Desludge Flows
- LTP Treated Sludge
- LTP Treated Liquors

Other streams identified are:

- Site surface rain run-off.
- Washdown for maintenance and cleaning.

Primary Sludge Thickening Liquors (Picket Fence Thickener Liquors)

There are two picket fence thickeners on site which receive Primary sludge directly from the Urban Waste Water Treatment Process. Approximately 234 m3/day of liquor is produced from the process. This drains together with the SAS thickening liquors back to the works inlet via Liquor Return Pumping Station 1. The ammonia concentration at this point is low, the same as the urban waste water stream it has come from.

SAS Thickening Liquors

On average approximately 543 m3/d of liquor is produced in the thickening of SAS. The thickening equipment used onsite at Basingstoke STC is belt thickeners. Polymer solution is input into the thickening process, as well as the biological surplus activated sludge from the final settlement tanks onsite. The solids levels coming off the thickening equipment in operation are monitored to ensure the equipment is performing as required. The aim is to capture as many solids as possible and not return them to add un-necessary load back to the effluent stream. Ammonia concentration is that of the final effluent (urban wastewater).

Pre THP Dewatering Liquors

Sludge is subjected to thickening prior to THP using sludge belt presses. A feedstock of primary biological sludge is combined with polymer solution to produce a thickened sludge and a liquor. Approximately 457 m^3/d of pre digestion dewatering liquors is produced. The solids levels coming off the dewatering equipment in operation are monitored to ensure the equipment is performing as required. The aim is to capture as many solids as possible and not return them to add un-necessary load back to the effluent stream. The ammonia loading at this point is also expected to be significantly low.

Digested Sludge Dewatering Liquors

Digested biological sludge is dewatered using three belt presses to produce a solid cake. The liquors are treated in the liquor treatment plant before being returned to the head of works. A polymer is used in the dewatering process to aid in binding the solids and predominantly remains in the dewatered sludge solids. Approximately 304 m3/d of post digestion dewatering liquors are produced. The treated liquors from the LTP return to the Urban Waste Water Treatment Process via Sample Point and Transfer Point 2. The ammonia concentration of the digestion liquors is high which is why they require treatment by the Liquor Treatment Plant.

Biogas Condensate

A very small volume, approximately 1m3/d in total, of condensate is produced from gas condensate traps on biogas lines. The result of this is a liquid waste stream made up mostly of condensed water vapour. The condensate trap systems are sealed, with no chemical addition. There is no solids, BOD or ammonia load in the condensate.

OCU Liquors

The OCU within this permit application produces on average a total of approximately 110 m3/ day of OCU Liquor are returned to head of works.

Boiler Waste Waters

Boiler blowdown contains concentrated hardness which would be damaging to the internal of a boiler but not at all significant in relation to Urban Wastewater Treatment. Volumes are in the order of less than 1 m3/day. They are returned to the head of the works via Liquor Return Pumping Station 2.

Reverse Osmosis Plant Waste Waters

Our plant backwash is used to wash the membranes and keep them in good performance and not significant in relation to Urban Wastewater Treatment. Volumes are in the order of 1-3 m3/day. They are returned to the head of the works via Liquor Return Pumping Station 2.

Liquor Buffer Tank Desludge Flows

Liquors from the post digestion dewatering are allowed to settle in the Liquor Buffer Tank prior to treatment in the Liquor Treatment Plant. A small volume containing settled solids is returned to the head of the works each day. The solids are organic matter from the digestion process. Volumes are in the order of approximately 2 m3/day. They are returned to the head of the works via Sample Point 2 and Transfer Point 2.

Liquor Treatment Plant

Liquors from the post digestion dewatering are high in ammonia and need to be treated prior to returning to the Urban Waste water Treatment Process. The plant at Basingstoke STC is biological and utilises the anammox process. The liquors are treated to have an ammonia concentration roughly similar to flows at the inlet of the Urban Waste Water Treatment Process.

LTP Treated Sludge

Surplus biological matter (activated sludge) from the Liquor Treatment Plant is transferred to the Urban Waste Water Treatment activated sludge Process as required. Volumes are in the order of approximately 1 m3/day.

LTP Treated Liquors

Liquors are separated via lamella separation. Liquors are transferred to the Urban Waste Water Treatment activated sludge Process. Volumes are in the order of approximately 303 m3/day.

Site Surface Rain Run-off

There are surface water drains in the sludge treatment area of Basingstoke STW which are returned to the head of the works.

Washdown for Maintenance and Cleaning

There is maintenance and cleaning within the sludge treatment area onsite at Basingstoke STW. These flows will only contain biological sludges produced onsite and final effluent from the wash water system. Flows will be adequately diluted.

Sample Locations

We propose to sample the wastewater streams described above as set out below in Table 1 which lists the locations identified as provisional sampling points and waste waters present. These flows are also shown in the accompanying documents: Process Flow Diagram (A.5) and the sample locations in Site Layout (A.2).

Table 1: Sample points

Sample Point	Grid Reference
S1: Picket Fence Thickener liquors, SAS Thickening Liquors, Pre-THP Dewatering Liquors, , Biogas Condensate, OCU Waste Waters, Boiler Waste Waters, Reverse Osmosis Plant Waste Waters, Liquor Buffer Tank Desludge Flows, Surface Water Run Off	SU 76429 55335
S2: LTP Treated Sludge, LTP Treated Liquors	SU 67467 55299

Composite Sampling

The returns from thickening/dewatering equipment identified above combine as indicated in Table 1 and the Process flow diagram (A.5).

Thames Water will sample each location listed in Table 1 in accordance with Environment Agency Guidance. Where individual flow proportional samples are taken at each sample point, each flow proportional composite sample may be combined to provide a single flow proportional 'bulk' composite sample for analysis. Return flow data will be used to ensure the single bulk composite sample is representative of the total flow returned.

Location of Liquor Return.

Thames Water confirms liquor returns to the WwTW inlet will be relocated downstream of the 'storm separation point'. This will prevent waste-water emissions from the installation by passing the WwTW treatment process and being emitted directly to surface water during storm conditions.