

**Appendix 1a: IPPC Application Information – Samlesbury Capacity Increase**

# Introduction

Budweiser Brewing Company UK&I are in the process of increasing the capacity of the Samlesbury Brewery by a planned 2Mhl p.a. (4.46M to 6.43M, limit engineering capacity) in order to meet a forecast increase in demand in the UK, and to reduce the requirement to import finished product.

The additional capacity will be liberated by the tactical removal of capacity pinch points in Brewing, Filtration and packaging.

In terms of environmental impact it would be expected that total emissions (discharge to atmosphere, liquid effluent, solids waste) would increase pro rata with capacity, the steps taken to mitigate this are listed below and are stated relative to a pro rata increase.

# Design Approach

As stated above the investment has been made on the basis of tactical removal of capacity constraints. As such much of the existing technology is retained.

Where new equipment has been included it has been selected not only to improve the capacity but also within the constraints of the surrounding equipment to reduce overall environmental impact.

All equipment will be implemented in a fully automated fashion such that opportunity for loss of containment due to human error is eliminated in normal operation.

In addition to this there are a number of existing site operational projects aimed at improving the effective use of existing equipment.

# Main Equipment - Brewing

Essentially the brewhouse operation will move from a single dry goods stream and 2 brewhouse streams each capable of 5-6 brews per day to 2 fully separate brew streams, one capable of 9 brews per day and the other 14 brews per day.

The main equipment to be installed is as follows:

## Dry Goods Handling

There will be no extension to the existing silo block, total grain storage on site will be unchanged

The existing intake systems for malt and adjuncts will be unchanged, but the full system will be put back into commission.

An additional transfer line, including weigher, sieve, destoner of capacity 14 t/h will be installed to compliment the existing line, effectively doubling the capacity of grain handling.

This equipment will be designed and operated in accordance with the DSEAR regulations since malt dust is explosive within certain concentration limits.

## Milling

The existing system will be modified to provide 2 mill streams each of a capacity of 14 t/h feeding to the existing 2 grist cases.

One mill stream (and eventually both) will be designed to remove a fraction of the husk from the milled malt which can eventually allow the husk to become a separate byproduct stream although in the immediate term the husk will be added back to the spent grain byproduct stream.

This equipment will be designed and operated in accordance with the DSEAR regulations since malt dust is explosive within certain concentration limits.

## Brewhouse

The following equipment will be added:

1 mash conversion vessel/cereal cooker dual purpose vessel

1 mash filter type Meura 2001 sized to match existing batch lengths

1 additional pre run tank (underback) to work with the mash filter

2 wort preheaters with associated energy storage tanks (one for each brewstream)

1 mash filter CIP system

Automated salts addition (for both lines)

# Main Equipment Fermentation and Maturation

## Fermentation

There is no new equipment foreseen in the fermentation area, although it is likely in future years as product mix evolves that additional fermentation equipment will be required.

## Maturation

It is intended to replace the existing separators (centrifuges) between fermentation and maturation with uprated (but in terms of speed and cleaning capability) units of 600hl/h. This in turn reduces the solids loading in maturation and improves filterability (hence filtration capacity)

# Main Equipment Filtration

The existing principle of 2 filtrations streams working with (existing) Kieselguhr filtration units will be retained, but the capacity will be enhanced by increasing the run period between necessary regenerations. The new equipment to achieve this consists of:

2 new continuous regenerable stabilisation systems (one per stream) – eliminating the need to dose “lost PVPP”

2 uprated blender carbonators (one per stream) allowing filters to run at maximum throughput without pre-dilution

Replacement chillers and trap filters – to match increased sales gravity beer flowrates

1. **Main Equipment Bright Beer**

In order to accommodate the capacity for an additional can line, and to resolve existing issues with flexibility the following new equipment is planned:

2 new bright beer transfer mains DN125 (allowing increased beer transfer rate)

4 new bright beer tanks of capacity Ca 3500hl each capable of supplying all existing bottling and canning lines plus new can line

New recovery CIP set sized for new mains and BBT cleaning

# Main Equipment Packaging

A new can line is foreseen with the capacity to package the additional throughput (1 line, 120,000 cph)

One existing can filler will be replaced with a comparable unit (end of life replacement plus flexibility of pack size)

A Krones Variopack system will be installed to increase packaging flexibility from bottle line 4

# Main Equipment Utilities

The only utility increases foreseen as part of this project is the addition of an additional wet cooling tower in the centralised refrigeration system which would allow the existing installed capacity to be used to its full potential (existing equipment is limited in its ability to reject heat)

A second compressor and evaporative condenser unit will be installed for the maturation ammonia system as a replacement to the existing system and allowing the removal of redundant/surplus equipment from the area. The existing compressor and evaporative condenser will be retained as a standby unit.

This equipment will be designed, assessed and operated according to the DSEAR regulations as Ammonia is a potentially explosive gas. Ammonia systems will be operated to the HSE SMARS guidance. The planned design is replacing a part of the equipment which is at end of life. As such it comes under the heading of repair rather than new system - we are replacing the compressor and evaporative condenser.

All work will be done by competent contractors under the control of the ABI nominated body. There is no intention to include heat recovery since there is no readily accessible low grade heat sink. Regarding the centralised refrigeration system we are not touching into the ammonia process side at all - we are installing an additional cooling tower.

With regards potential increase of CO2 from this, we anticipate additional CO2 generated (excluding from fermentation) = current CO2 per hl x 2200000 (not immediate increase but phased over time).

With regards to emission monitoring as the project does not introduce any new processes our current existing monitoring arrangements will continue.

It is likely there would be additional NOx/SOx emission monitoring requirement at the point when the BTS is introduced since the biogas will contain sulphur. However, the first phase of the plant will almost certainly be too small for that so the biogas could well be flared. It may be necessary to check on the amount of SOx/NOx generated if there is a flare and have the dispersion modelled this will be included the BTS development project being led by our European Environmental Team.

Any emission relating to boilers is already covered in a previous permit amendment which covered the installation of new boilers.

The increased capacity will draw increased water use from abstraction boreholes, there is sufficient capacity in the current abstraction licence for the increased water take.

Further to this ABI are currently investing in renewable energy technologies to support the increased electrical demand, specifically the use of solar panels off site.

# Main Equipment BTS

A BTS system on the brewery effluent is foreseen to biologically treat 15 ton COD/day.

The effluent treatment plant will need to be a listed activity in its own right (5.4 A (1)(a)(ii) as the current design is set at 3800 m³/day so exceeding the 50 m³/day.

BTS stands for Biological Treatment System or effluent treatment system. The installation will entail: a mechanical screening – a buffer basin & calamity tank – an anaerobic digester with the potential of biogas recovery – a small reaeration tank for odour removal.

The capacity will be designed in such a way that the requirements from United Utilities will be met as a minimum. The potential to use biogas on site will be foreseen but this will be captured in a separate project.

This corresponds to roughly 60% of the total effluent that will be treated before discharge to United utilities. With this capacity the current contractual final effluent limits with United Utilities are met.

This BTS capacity will enable Samlesbury Brewery to treat 100% off the effluent flow in the future with housekeeping improvements (lowering IOL to 0.8 kgCOD/hl and Water usage to 2.5hl/hl beer). The term stands for Index of Organic Load, it’s an internal measurement used by ABInbev to indicate the amount of COD per hl beer produced. This is an important design parameter for the BTS and an indication of product losses in the brewery.

Technology foreseen: Pre-treatment in combination with Anaerobic treatment for Biogas production and recovery.

Full inline parameter measurement (TCO, redox, TSS, pH, etc.) is foreseen for improved operational management. This enables ABI to optimize removal efficiencies and biogas recovery with limited manhours. The buffering/equalization phase is also decreased this way.

The whole BTS will be build in a modular way so future expansion if required is facilitated.

The biogas recovery project will be a separate project and given the nature of the gas the necessary safety requirements will be taken into account. With regards to the BTS itself, as a producer of the biogas, also all safety measures will be taken. A flare for burning the biogas to avoid pressure build up will be foreseen with the necessary fail safe safety controls.

# Management of the activities

## Accident management

New equipment for ATEX relevant areas (malt handling, milling, ammonia refrigeration) will all be designed and implemented in accordance to the regulations. The existing systems relating to risk of loss of containment of ammonia will be retained in the maturation compressor room

## Energy efficiency

Wort preheaters with energy recovery systems are proposed for the new brewhouse. These will provide a reduction of specific energy consumption of approximately 10.5 MJ per hl produced for the total production of the brewery – a saving of 67.5TJ at nominal new capacity .

## Efficient use of raw materials and water

Significant strides in the reduction of water consumption have already been made by the brewery. Improved dryness of ejection from new separators will make a small (almost negligible) reduction in specific water consumption.

The technology choice of a mash filter for the new brew stream gives a reduction of > 1% of raw material consumption for that stream (more efficient extract recovery).

The spent grain produced by the mash filter stream is significantly drier than that from lauter tuns. This reduces leakage of high COD liquid to effluent stream and reduces transport energy (less trucks required per unit of feed value)for the spent grain byproduct stream.

The separation of husk at the milling stage (not required for mash separation in the mash filter) allows for potential separation of a higher value byproduct (although the market for this byproduct is yet to be developed), or for a reduction in moisture content in spent grain.

## Avoidance, recovery and disposal of wastes

The installation of regenerable stabilisation system removes the PVPP (Polyvinylpolypyrrolidone – a stabliser used in beer production) (from the filtration waste stream which, together with improved solids removal from maturation should reduce the total volume of Kieselguhr waste by approximately 50%, albeit at the cost of incremental COD load in liquid effluent.

# Operation

## Operation techniques

The system is fully automated with manual supervision in its normal mode of operation. The system will fully shut down if any deviation from normal operation is detected.

Operation and maintenance of the plant shall be incompliance with the manufactures requirements with weekly / monthly check being carried out to ensure the plant is operating at peak efficiency minimising energy usage and emission’s.

## Process control

The system has its own dedicated PLC to ensure efficient and effective control with manual supervision.

## Raw materials preparation

Water is softened prior to entering the boilers and steam generators and condensate is recovered back to the plant for reuse.

The HPHW boiler plant is a closed system with negligible water losses in general operation.

## Heating processing using steam or water

Not applicable to this system.

## Cooling, chilling, freezing and freeze-drying

Not applicable to this system.

## Separation and concentration of food components- extraction

Not applicable to this system.

## Cleaning and sanitation

None required in normal daily operation.

# Emissions and monitoring

## Point Source Emissions

The increased beer production levels will lead to an increased release of CO2 from the fermentation process in line with increased production levels. A separate project looking at the infrastructure for the recovery of CO2 is ongoing but will not be implemented as a part of this project. Refer to above comments regarding CO2.

## Fugitive emissions

Fugitive emissions of odour are possible in case of the failure of either of the energy recovery systems, but since these are based on water recirculation the reliability can be expected to be very high.

Fugitive emissions are possible in case of loss of containment or overpressure in the maturation refrigeration equipment. Existing safeguards (atmospheric monitoring, automated shutdown) will be replicated on the new equipment.

## Odour

As a part of the energy recovery system all vapour from wort boiling is condensed. This represents a (marginal) improvement over the existing system where, in the situation where both wort kettles are boiling simultaneously, a small proportion of the vapour might be vented to atmosphere.

## Monitoring

The system has a fully automated monitoring system with manual supervision to ensure it is always operating safely and within its design parameters.

Within 4 Months of commissioning the initial tests will be undertaken and then at least biannually. Refer to above comments regards emission monitoring.