Supporting documentation for permit variation EPR/QP3634DQ/V002

Star Brands Limited, Dunlop Road, Redditch, B97 5XP

June 2025

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Client Name:	Star Brands Limited
Document Reference:	20871102-WAT-XX-XX-RP-N-78-P01.01
Project Number:	WIE20871

Quality Assurance – Approval Status

This document has been prepared and checked in accordance with
Waterman Group's IMS (BS EN ISO 9001: 2015, BS EN ISO 14001: 2015 and BS EN ISO 45001:2018)

Revision	Status	Date	Prepared by	Checked by	Approved by
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Comments

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Revision		Status	
P*nn*	Preliminary (shared; non-contractual)	S1	Coordination
C*nn*	Contractual	S2	Information
		S3	Review & Comment
		S4	Review & Authorise
		S5	Review & Acceptance
		A0, A1, A*n*	Authorised & Accepted (*n*=work stage if applicable)

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1.1 Changes to the installation requiring a permit variation

This document provides all the supporting documentation required to vary the environmental permit (QP3634DQ, issued 6 January 2017) for Star Brands Limited's Installation at Hunt End Industrial Estate, Dunlop Road, Redditch.

The regulated activities undertaken at the site have not changed significantly since issue of the original environmental permit in 2017. However, this permit variation application was required as a consequence of increased liquid product volumes manufactured, which in turn led to increased hazardous and non-hazardous waste volumes. It is no longer possible for the site to remain below the Low Impact Installation (LII) criteria applied by the existing Part A(1) standard rules permit (SR2009 No 2). As the LII thresholds for waste production can no longer be met, a bespoke Part A(1) environmental permit is now required.

This variation application also adds buildings and yard areas to the installation boundary, increasing the area of land regulated under the permit. The installation boundary will now need to include Units 17, 21, 23 and 29 as well as the yard area in between these units.

A significant proportion of raw materials used within the regulated activity are now temporarily stored in Unit 29, which is not within the existing boundary. Star Brands' Chemical Inventory Controller manages the inventory of substances in Unit 29 and chemical movements throughout the installation. Star Brands operates on a 'just in time' system of raw material delivery, reducing the amount of non-bulk chemicals present at the site at any one time to what is required for 48 hours production. As a result, there are many deliveries and collections of raw materials and partially used raw materials to and from the site. Star Brands utilises logistics system to manage heavy goods vehicle traffic, which also provides a means of tracking each raw material container.

Since the time of the initial standard rules permit application in 2016, there have been no changes to the liquid product manufacturing process. Liquid product manufacturing continues to consist of filling the blending vessels with the appropriate ingredients for specific product following a step-by-step approach. After completion of the mixing process and quality control, sampling and analysis, the contents of each blending vessel are transferred to the bottle filling lines, prior to packaging and despatch off site directly to customers or to off-site product warehouses.

Increased production volumes have been achieved by extending site operational hours by working a shift system. No additional process equipment has been required.

There have been no relevant changes to infrastructure on site apart from moving the steam generating plant to an external location but housed in its own fully enclosed container unit.

1.2 Raw materials, water and environmental management

Raw material and total water consumption have increased, as have waste volumes produced compared to the time of the original permit application in 2016.

Water and energy consumption and efficiency constitute key environmental performance indicators for Star Brands and are recorded, monitored and reported to various organisations and schemes the operator has registered with or signed up to.

The site operates a written Environmental Management System (EMS) in line with the requirements of the latest European and UK guidance for regulated sites.

1.3 Emissions and nuisance risk

There have been no significant changes in emission to air from the process since the 2016 application. The only additional emissions are occasional excess steam venting to atmosphere in two locations.

Emissions to sewer have reduced as all the process effluent associated with cleaning of vessels is now removed off-site as liquid waste in IBCs rather than being discharged to sewer as a trade effluent. There are still some emissions to sewer, but these are of a lower volume and concentration than in 2016.

There are still no direct process emissions to surface and groundwater and the only emissions are associated with surface water runoff from the roof and the yard to public surface water sewer.

There are some sources of external noise that require careful management due to the site's proximity to residential properties. Maintenance and operational practices are the main control measures achieving this. Noise surveys and installation of mitigation measures supplement this should this be required as a result of additional noise sources being introduced to the overall noise emissions from the site.

Small amounts of fragrances are added to most product batches but as there is no air extraction from the manufacturing buildings or directly from the process vessels to the atmosphere any odour emissions are unlikely to reach nearby sensitive receptors.

1.4 Environmental risk assessment

An environmental risk assessment has been carried out to assess the risk from the site as a whole, taking into account the operational changes discussed in the application, on sensitive human and ecological receptors near the site. The assessment concludes that the risks remain insignificant or are managed at an acceptable level without the need for additional control measures.

2. Introduction

This report provides the supporting information for the permit variation application EPR/QP3634DQ/V002 for Star Brands Limited's (Star Brands') facility at Hunt End Industrial Estate, Dunlop Road, Redditch, B97 5XP.

The information presented support the requirements of the following permit application forms:

- Part A – about you
- Part C2 – varying a bespoke permit
- Part C3 – change an installation permit
- Part F1 – charges and declarations

Advanced pre-application discussions have been held with the Environment Agency (EA) and the resulting written advice has been included as Appendix A. The advice states that it is most likely that a substantial variation concerning a Section 4.1 A(1)(a)(xi) production of surface-active agents activity is required.

The regulated activities undertaken at Units 17, 21 and 23 within the facility have not changed significantly since the since the time of the original standard rule (SR2009 No 2 – Low Impact Installation (LII)) permit application in 2016. The changes that triggered the need for this variation application are associated with increase in production within both the regulated activity (liquid production) and non-regulated activity (paste and powder production).

Paste and powder-based products are manufactured in Units 25 and 27 on the trading estate using mixing and blending processes only: these are not a chemical production process, as defined under Environmental Permitting (England and Wales) Regulations, 2016, as amended (EPR), and do not use organic chemicals produced by the regulated activities at the site. As a result, a permit is not required for paste and powder production processes and therefore this permit variation application relates only to the liquid production activity. This is clearly demonstrated by excluding Unit 25 and 27 from the installation boundary, as seen in Appendix B.

The main operational changes in the liquid product department relate to the storage and disposal of detergent washings and the delivery and storage location for raw materials. Due to these changes, the facility can no longer comply with all LII criteria. Daily and annual average daily waste volumes from the facility now exceed the respective LII criteria. It should be noted that the remainder of the LII criteria continue to be met, as was shown in 2023 and 2024 annual reporting for the installation.

An additional Unit (Unit 29) has been leased to accommodate raw material storage and handling as a result of increased production. This will necessitate a change to the installation boundary. A revised site layout showing the new boundary and plans showing emission points and raw material and waste storage areas are included in Appendix B.

Although Units 15 and 19 are used to store packaging material (plastic and cardboard) partially used in the regulated activity and partially for the paste and powder products this is not considered to lead to any environmental impacts over and above electricty used for lighting the Unit itself and hence remains excluded from the installation boundary.

An amended site condition report has been prepared and is inlcuded in Appendix C.

An environmental risk assessment has been prepared following the guidance published on the EA website using the Standard Rule 2009 No2 generic rule risk assessment as a basis.

A Best Available Technique (BAT) assessment has been undertaken in line with the following guidance documents.

- Technical guidance EPR4.02: Speciality organic chemicals Sector (2009) (expected to be the principal source of BAT Criteria)

Supporting sources of BAT Criteria

- Manufacture of fine organic chemicals (OFC) BAT Reference (BREF) Note (2006)
- Common wastewater and waste gas treatment/management systems in the chemical sector - BREF note (CWW) and BAT Conclusions (BATC) (2016)
- BREF document for common waste gas management and treatment systems in the chemical sector (WGC) (2023) and BATC (2022)

3. Environmental Management

3.1 Introduction

Star Brands operates an Environmental Management System (EMS) in line with the Plan-Do-Check-Act (PDCA) cycle.

In addition to managing Star Brands's operations, environmental aspects/impacts and compliance with applicable environmental legislation, the EMS provides the platform to manage additional environmental and sustainability requirements Star Brands have signed up to as active members of various organisations including:

- International Association for Soaps, Detergents and Maintenance Products (A.I.S.E.) Charter for Sustainable Cleaning Initiative (CSC)
- British Retail Consortium (BRC) Global Standard for Food Safety (BRCGS)
- Manufacturing (M2030) platform concerning scope 3 carbon emissions reduction.

3.2 Outline Summary of EMS

The most appropriate guidance setting out requirements on the EMS at the installation are considered to be the BREF Note and BAT conclusions (BATC) for Common wastewater and waste gas treatment/ management systems in the chemical sector (CWW). Table 1 presents a summary of the Star Brands's EMS in comparison to the requirements of the BAT1 from the CWW BATC.

Table 1: Outline Summary of Star Brands' EMS compared to BAT requirements

BAT requirements	Star Brands EMS	Document references
In order to improve the overall environmental performance, BAT is to implement and adhere to an environmental management system (EMS) that incorporates all of the following features:	The company implemented a written EMS.	EMS Manual
Commitment of the management, including senior management	The Environmental Policy is signed by both Managing Directors, who hold the most senior position in management at the site.	Environmental Policy 2025
An environmental policy that includes the continuous improvement of the installation by the management	The 'Environmental Policy 2025' document includes the following wording: "*……By demonstrating the Star Brands commitment towards environmental impact reducing methods, the business shall:* *Implement a programme of continual improvement in our business operations and prevent pollution……*"	Environmental Policy 2025
Planning and establishing the necessary procedures, objectives and targets, in conjunction with financial planning and investment	EMS manual contains or requires the following to be established • Company profile • Purpose and scope of the EMS • Environmental Policy • Organisation Chart, Roles and Responsibilities • Management System documents	EMS Manual Environmental Policy 2025 SOP.029: Environmental aspects Aspects and Impacts Register SOP.021: Training procedure

BAT requirements	Star Brands EMS	Document references

	• Planning
	  ○ Environmental Aspects
	  ○ Legal and other requirements
	  ○ Objective, targets and programme(s)
	• Implementation
	  ○ Competence, training and awareness
	  ○ Communication
	  ○ Documentation
	  ○ Control of documents
	• Operational control
	• Emergency preparedness and response
	• Checking:
	  ○ Monitoring and measuring
	  ○ Evaluation of compliance
	  ○ Non-conformity, corrective action and preventative action
	  ○ Control of records
	  ○ Internal audit
	  ○ Management Review
		SOP.012: Control of documents
		Business Continuity Plan
		SOP.014: Internal audit
		
		Documents are currently being developed for
		• Legal and other requirements procedure
		• Objective, targets and programme(s)
		• Communications procedure
		• Monitoring and measuring procedure
		• Evaluation of compliance procedure
		• Non-conformity, corrective action and preventative action procedure
		• Control of records procedure
		• Management Review procedure

Implementation of procedures paying particular attention to: (a) structure and responsibility;	Addressed in EMS manual via flowchart and documented responsibilities	EMS Manual
(b) recruitment, training, awareness and competence;	The SOP.021 Training procedure covers training company wide. New appointees to a role have their training needs assessed, and training is delivered based on requirements of the role as per the job description. Training needs for all roles are set out in spreadsheets along with dates of completion of training and refresher arrangements. Each employee holds a personal training record, which comprises the training received, evidence of completion and confirmation of competence through the supervisor signature. Specific environmental training incudes • Chemical safety; • Fire safety awareness; • Understanding risks and hazards; • Environmental awareness; • Waste management; and • Spill training. Completion of required training is monitored monthly by department managers and performance and completion or non-completion reports are compiled and sent to the HR manager	EMS Manual SOP.021 Training HSE training matrix ICL01 Induction questionnaire Departmental records of SOPs and associated training records, such as the ‘Blending Standard Work Matrix’ for blending department operators

BAT requirements	Star Brands EMS	Document references
	The business provides a platform where all employees can achieve competence through e-learning and training platforms. Standardised awareness training is provided through the onboarding induction process. Star Brands Ltd ensures that all people performing tasks for or on behalf of the business, which includes contractors, sub-contractors and temporary staff have received sufficient information relating to environmental impacts in conjunction with work. This is currently documented through the site induction process. Competency is gained through successful completion of the induction questionnaire that follows. It is the contractor's host's responsibility to ensure all relevant environmental controls are applied	
(c) communication;	For internal communication, the Environmental Management Representative (HSE Manager) ensures information regarding the EMS and environmental performance data are readily available to employees. Forms of communication with the wider business is achieved by: • Department meetings/discussions (following management meetings); • Site and business wide emails; • Health, Safety and Environmental noticeboards; • Toolbox talks; • Tier 1 (supervisor), 2 (department manager) and 3 (management) meetings; • The monthly 5S audit and findings tracker; • Kaizen tracker with monthly improvement awards; • Employee inductions; and • Site contractor inductions. External communication would be as follows: • Complaints received by site would be directed to the Chief Operating Officer who will assess and direct action required; and • Press communication would be handled through legal department.	EMS Manual
(d) employee involvement;	HSE observations, near misses, incidents and accidents are reported through cards to each shift manager. Departmental managers record these on the DigiLEAN software which records incident details, initiates root cause analysis and records, tracks and signs off corrective actions. Employees from every shift are members of the safety committee. The committee undertakes monthly HSE walkovers.	DigiLEAN software and associated records Safety committee record
(e) documentation;	EMS documentation encompasses four levels as described below: 1. The EMS Manual, which incorporates the environmental policy specifying the principal objectives and environmental commitments of Star Brands Ltd. Objectives, targets and programmes are developed based on the company's environmental policy. The manual and policy demonstrate the company's commitment to continual improvement.	EMS Manual SOP.012 Document Control Procedure (to be amended to cover all EMS documents)

BAT requirements	Star Brands EMS	Document references
	2. EMS procedures concern processes the business follows. These provide a detailed description of the EMS elements and define who should do what, how and when. The Register of Environmental Aspects and Register of Legal and Other Requirements reflect these procedures. 3. Work Instructions, comprising operational control procedures or instructions, with defined responsibilities, to control the identified significant environmental aspects associated with the business' operations and activities. 4. EMS records arising from the manual, procedures and work instructions. The records include checklists, reports and meeting records, as defined in each procedure and instruction	
(f) effective process control;	Effective process control achieved through a variety of means but largely through a series of standard operating procedures (SOPs) (see operational techniques, Section 4).	Department managers hold and controls all SOPs relevant to the processes undertaken under their control
(g) maintenance programmes;	Maintenance programmes are described in further detail in Section 4 to this report.	
(h) emergency preparedness and response;	The business continuity plan identifies emergency scenarios and sets out emergency response and recovery actions.	EMS Manual Business Continuity Plan
(i) safeguarding compliance with environmental legislation	Compliance obligations are determined through annual reviews as part of Waterman's Greenspace legal register service. Compliance obligations and how they apply are documented through the Greenspace system online.	Environmental legal register on Waterman Greenspace
Checking performance and taking corrective action, paying particular attention to: (a) monitoring and measurement	The monitoring and measurement procedure will establish a clear system for tracking performance and ensuring objectives and targets are met and adhered to. In outline it will include the following procedural steps: • Establish performance indicators • Determine whether monitoring is required; • Establish appropriate monitoring frequency(ies) as well as type and frequency of calibration/ verification of equipment; • Develop a monitoring programme setting out all the detail and responsibilities for collecting and storing data; • Compile results into a suitable format for analysis and reporting; • Analyse, evaluate and review results; and • Document and feed information back into the monitoring programme	Procedure to be developed
(b) corrective and preventive action;	Sufficient actions to prevent repeat or recurring incidents or non-conformances are required. Arrangements concern the following steps: • Handling and investigating non-conformities or incidents; • Taking action to mitigate the impacts caused; • Initiating and completing corrective and preventative actions;	EMS Manual and separate procedure to be developed

BAT requirements	Star Brands EMS	Document references
	• Ensuring that the corrective or preventative actions taken to eliminate the causes of actual and potential nonconformity are appropriate to the significance of problems and commensurate with environmental impacts encountered; • recording the results of corrective and preventative actions; • Reviewing the effectiveness of corrective and preventative actions taken; and • Implementing and recording any changes in the documented procedures resulting from corrective and preventative actions. Details of any changes are required to be logged within EMS documentation.	
(c) maintenance of records;	Records are maintained to keep track of the business' environmental performance, to demonstrate conformity to the requirements of the EMS, legal compliance and the outcomes of the EMS. The control of documents procedure (SOP.012) concerns the collation, review, maintenance, storage and retrieval of records. Records are required to remain legible, identifiable and traceable to the activity. Records reference the specific product or service involved. Records are required to be stored at readily retrievable locations and protected against damage, deterioration or loss. The retention period of each type of record is specified.	EMS Manual SOP.012: Control of documents (to be amended to reflect EMS documents)
(d) independent (where practicable) internal or external auditing in order to determine whether or not the EMS conforms to planned arrangements and has been properly implemented and maintained	A procedure under development will outline the steps to be undertaken to conduct internal EMS audits. Its purpose will be to check that the EMS is functioning properly and that it delivers continued improvement, the EMS' objectives and targets and any other objectives stated in the environmental policy.	Procedure under development
Review of the EMS and its continuing suitability, adequacy and effectiveness by senior management;	A management review procedure under development will ensure the whole EMS is periodically reviewed by top management to ensure its continuing suitability, adequacy and effectiveness. The review agenda will include the following: • Status of actions from previous management reviews; • Changes in external and internal issues that may require a review of procedures or other elements of the EMS; • Changes in significant environmental aspects; • Extent to which environmental objectives and targets have been achieved; • Information of the site's environmental performance including trends in nonconformities and corrective actions, monitoring and measurement results,	Procedure under development

BAT requirements	Star Brands EMS	Document references
	compliance with legislation and standards subscribed to, and audit results; and • Furthermore, review of adequacy of resources, received complaints and opportunities for continued improvement will also be reviewed.	
Following the development of cleaner technologies;	This requirement is primarily met through the application of requirements under the CSC initiative. The CSC includes a focus on raw materials and product specifications. Procedures are in place to review raw materials, seeking suitable less hazardous alternatives where available. Requirements are set on suppliers with respect to testing, including animal testing.	SOP.423: Star Brands Raw Material Policy SOP.003: Raw material Data Management SOP.048: Raw material-packaging selection and supplier approval procedure
Consideration for the environmental impacts from the eventual decommissioning of the plant at the design stage of a new plant, and throughout its operating life;	The primarily environmental impacts from the installation's equipment are considered to concern waste. Where possible, Star Brands chooses equipment with modular designs from a common supplier where a good range of spare parts are available. This means equipment can be modified and reused elsewhere within the site, rather than needing scrapping and complete replacement. The versatility and adaptability of plant and equipment also simplifies changes to product containers and their sizes.	n/a
Application of sectoral benchmarking on a regular basis;	Benchmarking is undertaking through Star Brands' certification to the A.I.S.E. CSC Initiative, membership of the BRC and registration with M2030. External audits against the requirements of the standards, schemes and initiatives verify the standing of Star Brands.	CSC initiative BRCGS M2030

4. Operational Techniques

4.1 Raw material delivery, handling and storage

4.1.1 Introduction

Due to the space constraints at the site, the company operates a 'just in time' system of raw material delivery. Based on the sales forecast for the year, the head office Planning Department produces a six-week production plan that is used as the basis for weekly production plans produced by the Head of Manufacturing on site.

Raw material ordering for the medium term is a head office function undertaken by:

- the Technical and New Product Development (NPD) department, which identifies what raw materials are required; and
- the Purchasing Department, who identify principle and secondary suppliers and purchase the materials required.

Purchased raw materials are initially stored at a logistics company's warehouse. This contractor stores raw materials off site and transports them to the site 'just in time' in line with the weekly production plan drawn up by the Planning Department.

Chemical Inventory Controllers at the manufacturing site receive the required raw material list for the week ahead and place orders for deliveries. These deliveries are designed to provide the correct types and volumes of raw material to site to feed the production process for 2 days. The GoRamp logistic software is utilised to have full traceability of raw material logistics including origin and batch records. Material unused at the end of each production run are collected for return to the logistics' company warehouse, where these materials await recall to site when required. As a result, there are numerous deliveries to and collections from the site daily.

4.1.2 Delivery

Due to space constraints, yard areas are typically busy with deliveries, collections, loading and unloading of raw materials, products and waste during permitted site working hours. Delivery drivers are inducted and must follow the Supplier Delivery Manual, which sets out clear and detailed instructions of delivery of all bulk and non-bulk raw materials, including raw materials to be used in the regulated activity within the Liquid Products Department. The Supplier Delivery Manual sets out the site safety rules including minimum PPE required, arrival procedure, yard rules and map with dedicated loading and unloading areas, vehicle requirements-permitted vehicles/condition of the vehicle.

In addition, on site standards (SB STD) and SOPs cover the correct and safe delivery of materials and what to do if a spillage has occurred. Documents relevant to delivery are as follows:

- SB STD 005: Material Handling and Storage – Pollution Prevention Procedure;
- SOP191: Warehouse chemical goods in;
- SOP376: 3rd Party warehouse chemical goods in;
- SOP036: Safe handling of chemicals;
- SOP026: Tanker off-loading procedure; and
- SOP023: Spill procedure.

Bulk Deliveries

Bulk tank delivery points are located just outside Unit 21, as shown on site layout plan (Appendix B). A dedicated parking area is marked out for one bulk tanker in the yard area.

Pollution prevention measures in place for bulk deliveries are set out in the SB-STD 005, SOP026 and SOP023 documents. These measures are summarised as follows:

- Hard standing resistant to materials delivered;
- Vehicle impact protection for the fill point area;
- Clamp down drain covers installed over surface water drains during deliveries;
- Yard area able to temporarily contain one tanker load within the yard without leaving site;
- Spill kits and emergency shower in place next to the delivery point;
- Flexible delivery hose covers are used and secured at both ends. Drivers carry spare flexible hose in case of leaks or splits;
- Fixed pump speeds selected are suitable for the liquids transferred, the tanker and tanks;
- Overfill prevention: the filling process cuts off automatically if resistance is met by the pump;
- A Star Brands operator unlocks fill points and valves and supervises deliveries at all times;
- A Star Brands operator signs-off deliveries once complete and secures fill points and valves; and
- The spill response procedure, supported by members of the trained emergency response team on every shift.

Non-bulk Deliveries

Deliveries take place one Heavy Goods Vehicle (HGV) at a time, as arranged through the GoRamp logistics software. HGVs are required to use a dedicated bay marked in the yard. Drums, caged Intermediate Bulk Containers (IBCs) and bags are unloaded using on site FLTs following procedures SOP191 and SOP376.

After an initial check of the load manifest and integrity checks of the containers delivered whilst still on the vehicle, the Star Brands operator then proceeds to unload and move material into the goods in area inside Unit 29. Once completed, the load is checked against the manifest and current product labels are affixed to each container. These labels reference the product code and batch number from the manifest. A scanner and label printer are connected to the GoRamp software, facilitating control and tracking of every container received. The site's Quality Control Department then undertakes a quality check of incoming goods and samples material as required.

Sampling and testing are always undertaken where a first supply of raw material occurs, for example, after changing a supplier. Once laboratory and quality control checks are complete, each container is issued with a green label (OK) or a red label (Do not use and return). Red labelled containers are stored separately in a quarantine area within Unit 29. The manifest is updated according to test results and passed to the Chemical Inventory Controller.

Pollution prevention measures during delivery of non-bulk raw materials are as follows:

- Hard standing resistant to materials delivered;
- Use of approved suppliers delivering materials in suitable containers (e.g., caged IBCs, drums secured on pallets);
- FLTs used are fit for purpose, routinely inspected, maintained and serviced;

- Operators are trained and required to check integrity of containers on delivery. Containers with suspected damage identified at this stage are declined and stay on the lorry;
- An empty mobile double IBC/pallet bund is available during every delivery should integrity issues only be noticed unloading is underway;
- When moving non-bulk containers across the site during deliveries or operation, operators are trained to used drum carriers where appropriate and to follow routes reducing the likelihood of any spillage entering the surface water drains in the yard;
- Spill kits are in place next to the delivery point;
- The spill response procedure, supported by members of the trained emergency response team on every shift;
- Pumps are used to empty drip trays (double bunds) of lost materials or accumulated rainwater as appropriate. Drip trays are partially covered, limiting rainwater ingress; and
- Trained site operators undertake unloading and loading (at the end of a product batch) of raw materials. Operators follow SOP191, SB STD 005 and Safe Storage of Chemicals (SB STD 065) procedures.

4.1.3 Storage and Transfer

Introduction

Safe chemical storage, segregation and pollution prevention are central to Star Brands with the following standards and SOPs dedicated to this activity:

- SB STD 005: Material handling and storage pollution prevention;
- SB STD 065: Safe storage of chemicals;
- SOP016: Warehouse procedure;
- SOP036: Safe handling of materials; and
- SOP023: Spillage procedure.

SB STD 065 sets out the principles of safe storage at the site as follows:

Clear Labelling:

Label checking and updating is carried out on delivery as described in Section 4.1.2. Original packaging is required to be used, if there is a requirement to decant materials into a new container, Star Brands requires the container to be clearly labelled as above, alongside the name of a responsible person.

Compatibility:

Due to the large number of substances on site, it is imperative that incompatible chemicals are stored separately and are kept segregated. Flammable materials with low flashpoints are stored outside and minimal amounts are stored on site at any one time. Volumes held facilitate 48 hours of manufacturing only.

Inventory management:

Due to the ‘just in time’ operation, only materials needed for the next 48-hours of production are stored on site at any time, apart from the content of the bulk tanks. Stock is continuously checked and the collection and, if necessary, disposal of any substances that are out of date or no longer required is arranged daily, preventing a build-up of obsolete chemicals on the site or at the off-site warehouse.

Housekeeping:

Good housekeeping is essential in chemical storage areas. Leaks and spillages are required to be reported and cleaned up immediately. All solvent wastes and flammable liquids are kept in fire-resistant, covered containers until they are used or are removed from the site.

Vacuuming is used, whenever possible, rather than blowing or sweeping respirable dusts. Star Brands monitors bunds and spill trays to ensure these remain clear. Unnecessary items within the storage area, including combustible materials (wood, rags etc.), are removed.

Star Brands ensures there is a suitable way to clean up any spilt chemicals. This includes making sure that workers know what to do if there is a spill or leak, as set out in SOP023 (spill procedure).

This site keeps a live inventory of all raw materials used in the various product recipes and has a constant turnover of non-bulk raw materials due to the 'just in time' method of raw material delivery.

Bulk storage

There are five bulk storage tanks, which are dedicated to liquid raw materials that are consumed in high volumes. The tanks are located inside Unit 21 and each have a 30,000 kg capacity. The tanks are identified by the Star Brands raw material code (CXXYYY) for the chemical stored in each tank.

All five tanks are insulated to maintain storage of the material at appropriate temperatures as advised by the material Safety Data Sheet (SDS). This ensures the chemicals have the desired properties for use in the blending process, such as viscosity. All bulk tanks are fitted with trace heating between the tank wall and insulation (jacket). None of the tanks are cooled.

Tank fill level and temperature are monitored continuously, and readings are displayed at various points in and outside Unit 21. Temperature measurement occurs in the tank jackets and is used to control trace heating. The tanks only have breather valves to manage loading and unloading air displacement and are not pressurised.

Materials stored are as follows across the five tanks:

- CWD321 - Surfactant (acid based);
- CWD302 - Alcohol based surfactant;
- CWD304 - Cationic surfactant;
- CWD265 - Surfactant; and
- CWD328 - Organic acid surfactant.

Non-bulk storage

In order to manage the large volume of non-bulk material turnover, a live chemical inventory operates at all times. All containers arriving and leaving site (part empty for later recall) are marked with labels indicating the product code, batch number and status. The Chemical Inventory Controller coordinates operators involved in raw material ordering, goods-in checks, transfers between Unit 21 and 23 and returns to the off-site warehouse for later recall.

At the end of a particular product batch, the remaining raw materials are returned to the off-site warehouse via a reverse delivery procedure using the same logistics company.

Generalised pollution prevention measures for storage and transfer

Common pollution prevention measures across the installation are as follows:

- Impermeable hardstanding with no drainage inside Units used for storage (Units 21 and 29);
- Unit 21 and 29 buildings designed to act as secondary containment;

- Doors to the Units have a bespoke barrier to prevent any spillages leaving the building. SOP023 sets out when and how to deploy these barriers, e.g., during non-operational hours, or when a spill or leak has been identified or reported**;**
- Spill kits are available throughout Units 21 and 29 and the yard area for flammable (F) and general (G) liquid materials; and
- Absorbent roll stations available in Units 29, 17 and 23 for flammable (F) and/or general (G) liquid materials.

4.2 Manufacturing process

4.2.1 Planning

Star Brands produces a large variety of household cleaning products and laundry aids, both under their own brand names (Stardrops and Pink Stuff) as well as for other well-known brands or in-house supermarket brands. Manufacturing planning starts at the head office, incorporating the following into an annual sales forecast:

- New product development and launches;
- Demand forecasting for existing products;
- Contracts from third party clients.

This annual forecast forms the basis of the six-week production plan which is also produced by head office. This plan then requires Purchasing and Supply Chain Managers to ensure all raw materials are available and associated logistics are arranged for the 'just in time' delivery to site.

The six-week plan also forms the basis of the weekly production schedule drawn up by the Planning Department, which is based on the following principles:

- Grouping like-for-like substances to optimise raw material logistics, reduce the number of changeovers, cleaning time and water consumption and hence liquid waste generation; and
- Moving from light to dark products to reduce cleaning time and water consumption.

There are currently 18 liquid product groups, including general liquids, bleach, peroxide, gels, and super concentrates. Each group includes up to 26 different products. Production scheduling aims to ensure that products from each group are manufactured in sequence from light products to dark products.

4.2.2 Blending and mixing in Unit 21

Equipment – blending vessels

There are a total of 17 blending tanks in use, all of which are all of stainless-steel construction and are located inside Unit 21. The blending tanks are grouped together in the centre of the Unit. The tanks range from 2,600 to 15,000 kg capacity and vary on diameter, height, tank bottom and lid construction. All tanks are closed tanks with piped connections for bulk ingredients and water through the lid and hatches for manually poured or pumped ingredient addition.

All tanks have agitation in the form of a top mounted mixing shaft driven by an electric motor and mixing paddles mounted onto the mixing shaft.

None of the tanks operate under pressure or require heating or cooling. Once the blending process in complete, the product leaves the tank via a bottom outlet to be transferred to the appropriate filling line. Transfer by gravity is favoured but depends on the tank outlet position and the viscosity of the product. If gravity transfer is not an option, air pumps are used.

Blending process

Appendix D shows a process flow sheet for the blending and subsequent cleaning activities undertaken in Unit 21.

For each product batch, ingredients are added to the appropriate blending vessel(s) following the blend sheet. Blend sheets provide a step-by-step process of how much of which material to add in what order.

Water is always added first, and the agitators are switched on as soon as the water covers the bottom mixer blade completely. Two sources of water are used: deionised water prepared in an on-site Reverse Osmosis (RO) plant and raw water from the site's mains water connection. There are four ring mains delivering water to the blending tanks: two cold tap water supplies from Units 21 and 23, one hot tap water supply from the hot water boiler on the boundary of Units 17/19 and one for deionised water.

All bulk tanks are connected through a delivery pipe work system to a selection of blending/mixing tanks and the correct amount of raw material is delivered automatically once the pump is started via the preset pump control system.

Additional raw material addition is either through pump transfer from IBCs, drums or bags. Air pumps are utilised to transfer material from IBCs on the blending platform to the blending tanks. The appropriate IBC is placed onto a pallet truck with weighing scales and pipework is inserted at both ends and fastened temporarily to the IBC cage and the tank lid so that it does not dislodge during raw material transfer.

Smaller amounts of raw materials, such as fragrances or dyes, are weighed manually into buckets and jugs and poured into the blending vessel lid hatches manually.

Solid raw materials, for example scouring ingredient for the cream cleaners, are added directly from the raw material bags into the respective blending tank through a large hatch in the lid. Due to the powder nature of the material there is Local Exhaust Ventilation (LEV) fitted to the top of the two blending tanks dedicated to these types of products.

Each blending step is colour coded as follows:

- Green – normal action;
- Yellow – additional mixing time required; and
- Red – additional action required such as – such as a signature or check and signature.

A sample is taken at the end of the procedure and analysed and tested in the on-site laboratory for the following parameters:

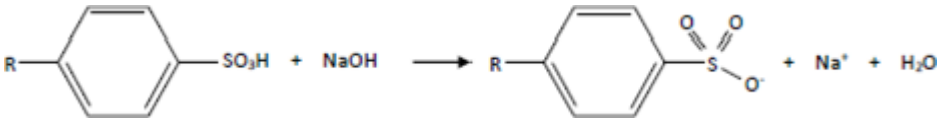
- pH;
- viscosity;
- density;
- colour; and
- odour.

If required, the laboratory issues corrective guidance stating what needs to be added to bring the batch within specification. Following these adjustments, a further sample is taken and analysed to ensure the specification has now been met.

Neutralisation

A key ingredient in many recipes are organic salts such as sulphonates and cocoates. These are manufactured during the blending process through neutralisation, i.e. adding sodium hydroxide or similar substances to sulphonic acid and fatty acids to generate the organic salts. The chemical equation featured below is an example of sulphonic acid neutralisation process.

This neutralisation process is the reason the site requires an environmental permit for the production of surface-active agents under Section 4.1 A(1)(a)(xi) to Part 2 of Schedule 1 to the Environmental Permitting (England and Wales) Regulations 2016, as amended.



If the blending process includes the neutralisation reaction, the process flow sheet in Appendix D does not change. The only additional instruction on the blend sheet may be to reduce mixer speed to eliminate splashing and to mix slowly and to ensure that added acid/ alkaline substance has been added and dissolved completely. Furthermore, there may be notes describing expected physical changes such as thickening and a slight rise in temperature.

Sampling and laboratory analysis remains as described in 'Blending process' sub section above, independent of whether neutralisation occurs or not during the blending process.

4.2.3 Product filling lines

Finished product is transferred to one of four automated filling and packing lines across Units 17 and 23 via the pump room either by gravity or by pumping if tank outlet is too low or product viscosity too high. All 18 blending tank outlets are routed to the pump room tank flow plate where each tank outlet can be linked to each filling line via the filling line flow plate using flexible hose connections. Once the connection is established the product is transferred using air operated diaphragm pumps (AODD pumps) to a small header tank at the individual filling line, and from there into the dedicated product containers.

For some product batches more than one blending vessel is used. When one vessel has been emptied, the flexible pipework is connected to another blending vessel outlet in the pump room to continue filling product containers at the filling line. This process is semi-automatic but also relies on radio communications between the Filling Line Operator and Blending Vessel/Pump Room Operators.

Should the filling line stop for any reason the product flow to the header tank would stop automatically to prevent the header tank from overflowing and product wastage.

The pump room is a segregated bunded compartment within Unit 23. There is an outlet to sewer on the pump room floor which connects to the foul sewer. In the past, certain clean out wash waters were discharged to sewer. This has been discussed further under the 'Cleaning -mixing vessels' subheading below and in section 7.3 (point source emissions to sewer and controlled water).

4.2.4 Cleaning – mixing vessels

The site has developed a cleaning scheme centred on the reduction of water use and minimal use of cleaning chemicals, such as caustic or sterilisation solutions.

Across the 18 product groups there are 324 different changeover scenarios, The company has devised a clean down matrix setting out which scenario applies when changing from one product group to another. Six different cleaning procedures are applicable as follows:

1. No waste rise (10% of changeovers);
2. Rinse (20% of changeovers) ;
3. Detergent (46% of changeovers);

4. Sterilisation (9% of changeovers);
5. Bleach/peroxide (10% of changeovers); and
6. Caustic (5% of changeovers).

These scenarios are discussed in further detail below.

1 No waste rinse

This process is utilised where products from the same product group are manufactured in sequence. This applies to the majority of product groups (15 out of 18) and changing from ironing water to any other product group and represents about 10% of the cleaning routine scenarios.

In summary, this involves rinsing the ceiling/mixer paddles, sides and bottom of the vessel with clean water. Rinsewater is retained for use as the initial water volume for the next batch of product. No cleaning wastewater is produced.

2 Rinse

This process is utilised when changing from four product groups to the majority of the rest and represents 21% of the cleaning routines.

This cleaning process involves rinsing the ceiling/mixer paddles, sides and bottom of the vessel with clean water, pumping the wastewater to the pumproom and from there to wastewater IBCs for recovery off-site.

3 Detergent

This is the most common clean down procedure and is used for 46% of changeovers.

This process involves rinsing the ceiling/mixer paddles, sides and bottom of the vessel with clean water, pumping the water to the pumproom and from there to wastewater IBCs for off-site recovery.

4 Sterilisation

Sterilisation clean downs are required mainly when changing over to non-biological detergent, delicates washing detergent and ironing water product groups representing about 9% of the cleaning routine scenarios.

The process is similar to routine 2 and 3 above, with the additional step of spraying a sterilisation solution onto the ceiling/ mixer paddles, sides and bottom of the vessel and leaving it for 20 minutes prior to a second water rinse down/flush out and pH check.

Wastewater is sent to IBCs via the pump room.

5 Bleach/ peroxide

This routine is used only after completing the production of products in the bleach and peroxide product groups and ensures all remnants of these chemicals are removed. This represents about 10% of the cleaning routine scenarios.

A rinse down is followed by a flush out with larger volumes of water. Cleaning is verified through sampling and laboratory analysis, including a pH check.

Wastewater is removed to IBCs via the pump room.

6 Caustic

This routine is used only after completing the production of products in the crease releaser product group and ensures all remnants of these chemicals are removed. This represents about 5% of the cleaning routine scenarios.

The process is similar to routine 2 and 3 above with the additional step of spraying a caustic solution onto the ceiling/ mixer paddles, sides and bottom of the vessel. The solution is left for 30 minutes prior to pressure washing, a rinse down and finally a flush out and pH check.

Wastewater is sent to IBCs via the pump room.

Product transfers and wastewater management

All wastewater from blending tank cleaning is now collected in IBCs. Transfers to waste IBCs are undertaken via a manual air diaphragm pump. Flexible hosing between the pump and the IBC passes over the southern pump room wall and into IBC located just outside the pump room in Unit 23. Hoses are inserted and secured to the IBC inlet to prevent accidental dislodging and spillage of waste into Unit 23.

For product transfers to the filling lines, flexible hosing is connected to the appropriate blending tank outlet on the blending tank flow plate western pump room wall.

4.2.5 Filling line cleaning

Once a product batch has been completed, the filling lines are cleaned down in accordance with a multistep process. In summary, the steps are as follows:

- Stop the line and put the line process control into maintenance cleaning mode.
- Turn off the product pump (filler line) and close valve on product pipe (pump room).
- Undertake a pigging process to clear about the pipework from the pump room to filler line. Cleared product enters the filling line header tank.
- Product displaced by pigging is waste and is pumped to a waste IBC.
- If required, flush water through the pumps and undertake a Clean in Place (CIP) procedure (lines 1,3 and 4 only).
- Flush a small amount of the next product through to the filler line and flush through the fill nozzles.
- Turn off the waste pump and restart the bottle feed.

4.2.6 Equipment and floor cleaning

As there are no drains in Units 21,17 and 23 where production, filling and packing takes place; cleaning is not undertaken by water spray down but by using absorbent pads to wipe down/mop up any free product.

Floors are periodically cleaned manually by operators using a mop and bucket in enclosed areas and a mechanical mop (floor scrubber) in more open areas. Cleaning is undertaken using tap water only, with no additives used. Wastewater is discharged to sewer via the pump room to emissions point SW1.

4.3 Ancillary activities

4.3.1 Water treatment

There are two water treatment processes for production: using acid-based Ion Exchange (IX) to produce deionised water and producing purified water using reverse osmosis (RO).

All plant is located on the mixing platform in Unit 21 close to where the deionised water or purified process water are required. Raw water is delivered from the mains connection. Wastewater from the purification process is released to the sewer via the pump room under a trade effluent discharge consent.

Water used in the steam generating plant is treated (softened) separately using a carbon filter cartridge located inside the plant room just outside Unit 17. Waste water from the softener plant is discharged

together with blowdown form the steam plant to sewer under a separate Severn Trent small volume letter of authorisation (SVL) just outside Unit 17.

4.3.2 Steam generation/hot water boilers

Steam

Label sleeve application for liquid product bottles is achieved by shrinking the labels onto the bottles using steam tunnels on two of the five filling lines (lines 3 and 4), labelling and packing lines. Steam is provided by the 220kW$_{th}$ input steam generator located outside Unit 17.

Hot water

There is one 80kW gas fired boiler in use in Unit 19, which provides hot water for the blending platform where required in mixes and clean downs. The boiler also supplies hot water for amenity purposes and the offices in Units 17, 21 and 23.

4.4 Process control

4.4.1 Raw material management

Due to the complexity of raw material off site warehouse storage and the 'just in time' delivery servicing a constantly changing production schedule, digital supply chain management software (GoRamp) is used to maximise efficiency across the entire supply chain. The GoRamp logistic software is extensively manages delivery, labelling and return to off-site warehouse. This gives Star Brands full and live inventory and traceability of raw materials including origin and batch records as well as planning and managing difficult logistics at the site.

4.4.2 Raw material transfer from storage to blending vessel/ loading

All pumps and the Tapflo dilution systems used for dosing or mixing water and the transfer of bulk chemicals to the blending vessels are controlled by individual systems with Human-Machine Interfaces (HMIs).

Tapflo dilution and mixing station

One dilution/mixing station is used to produce on demand a certain quantity and concentration of bulk surfactant CWD265. The HMI allows the operator to program, monitor and control the system's operation to achieve the desired dilution ratio, flow rate, and other parameters.

A screenshot of the Tapflo HMI is shown in Figure 1.

Each control program provides the following modes:

- Setting the Required Concentration;
- Setting the Required Flowrate;
- Counters for concentrated surfactant, dilution water and diluted surfactant; and
- History of Errors.

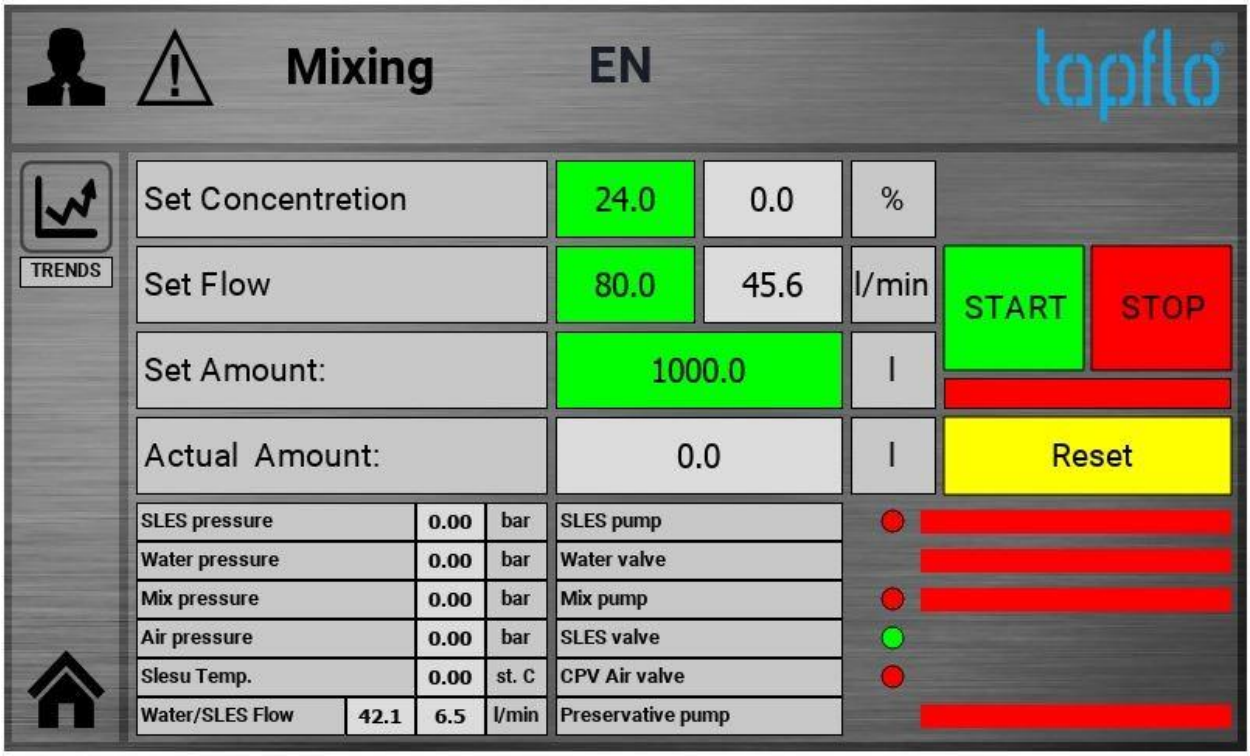


Figure 1: Screenshot of the Tapflo system

Other bulk tank raw material dosing

Other bulk raw material dosing into blending vessels is by pumps controlled via an HMI on the blending platform by the operators. This HMI allows setting, monitoring and controlling the addition of bulk materials to individual blending vessels. Once the programmed dosage has been delivered, the pumps stop automatically.

4.4.3 Blending vessels and filling lines

Blending vessels

Apart from the dosing pump control and display for bulk raw materials the blending vessels have additional local controls and displays for the mixers and LEVs (cream vessels only).

Due to the nature of the process measuring and monitoring of other process parameters such as pressure, temperature or pH are not required during the blending process.

Filling lines

There is a high degree of automation on the filling and packaging lines, and each line has a local PLC control system with HMIs for the filling line operators to set, monitor and control the entire filling line from bottle delivery, filling, cap/nozzle/lid placement to labelling and packaging.

Some key process parameters measured and controlled through the PLC are

- Header tank level and pressure;
- Filling volume per bottle (dose) [ml] and filling pressure;
- Speed – filler speed, conveyor speed, jog speed [bottles per min];
- Steam tunnel temperature [°].

Alarms are built into the process control to alert the operator if set process parameters are out of range such as for low header tank level, bottle orientation on the bottle-feeding mechanism etc. Process alarms generally include low- and top-level alarms. Low level alarms are visual and/or audible and top-level alarms automatically result in the filling line stopping and product flow ceasing.

In addition, there are also numerous manual controls to control the interface between the blending and filling process, as well as when switching between modes e.g. filling to cleaning mode, cleaning in place (CIP) or maintenance mode. Detailed SOPs are in place for each line and each dedicated activity for example SOP127 Line 1 Wash out to set out step by step what PLC settings to enable/ disable and which manual process controls (valves) to activate and in which exact sequence.

4.4.4 Ancillary activities

RO and IX water treatment plants

RO and IX equipment have localised controls, which have been provided through the technology supplier. These controls concern the process parameters described below.

RO plant

- pressure (feed water, permeate, concentrate);
- conductivity (feed and permeate); and
- flow (concentrate and permeate).
- temperature.

IX plant

- conductivity (feed and purified water);
- pH;
- flow rate; and
- resin capacity.

Boiler plant (steam)

The steam plant has localised control with an HMI displaying the status of the following process parameters:

- flue temperature
- steam temperature
- steam line pressure
- hot well temperature
- total dissolved solids (TDS) in the steam

4.5 Inspection and maintenance

4.5.1 Introduction

The site operates a mixture of the 'Freshdesk' computerised maintenance management system and a paper based planned preventative maintenance (PPM) system. Freshdesk is used to track reactive maintenance, including breakdowns, and records routine PPM undertaken. Freshdesk is updated after completing each round of PPM tasks. Relevant data associated with PPM tasks remains in paper form and is archived.

4.5.2 Inspections

Daily and monthly inspections are programmed through the PPM system. Maintenance routines include those concerning key assets serving the regulated process:

- Steam generator (daily);
- IX unit and RO plant (daily);
- Chemical bulk storage tanks (monthly);
- Bulk tank trace heating (daily); and
- Site compressors (daily).

Example template checklists have been included in Appendix E.

4.5.3 Periodic services

Regular PPM tasks are undertaken by Star Brands engineering and maintenance staff. In depth services are undertaken annually or based on operation hours by equipment suppliers under service contracts.

5. Raw materials, water and waste management

5.1 Raw materials

5.1.1 Selection, approval and review

Introduction

A suite of legal and other compliance obligations are related to the selection of raw material and ancillary materials. Examples of legislation that affect raw material selection are as follows:

European legislation

- EU REACH Regulation (EC) No 1907/2006;
- Classification, Labelling and Packaging of substances and Mixtures (EC) No 1272/2008;
- Detergents Regulation (EC) No 648/2004;
- Biocidal Products Regulation (EU) No 528/2012; and
- Explosives Precursors Regulations (EU) 2019/1148.

UK legislation

- Assimilated versions of the EU legislation listed above; and
- The Poisons Act 1972 and Control Explosives Precursors and of Poisons Regulations 2023.

There are numerous industry sector codes of practices, standards and guidance that Star Brands are signed up to, such as:

- BRC Global Standard Consumer Products (Current Issue);
- A.I.S.E Charter for Sustainable Cleaning;
- UK/EU REACH and CLP Regulation technical guidance documents; and
- Ethical trade commitments – SMETA audits by SEDEX.

To ensure the raw material selection process considers all requirements, the company has developed a wholistic approach to raw material selection to ensure social, economic and environmental sustainability factors are considered. There are several Standard Operating Procedures to manage this process.

SOP 423: Star Brands Raw Material Policy

All raw materials must be 'approved' by Star Brands personnel prior to use in any Star Brands manufactured product. This will confirm that all raw materials can be handled safely at the manufacturing site by workers and must ensure finished products do not present a risk to consumers or the environment when used as intended. SOP 423 sets out what is expected from suppliers in terms of their responsibilities and documentation. SOP 423 covers both new and existing suppliers.

Furthermore, SOP 423 sets out criteria for new raw material development, listing the conditions with regards to aspects such as animal testing, animal derivatives and genetically modified ingredients. Specific environmental conditions include a requirement that surfactants comply with the biodegradability criteria under the European Detergents Regulation. Suppliers are also required to confirm that raw materials supplied are derived from sustainable sources of palm and/or palm kernel oil (where applicable) on the Raw Material Supplier Questionnaire (RMSQ).

SOP 423 states which physical and chemical hazard statements (singly or in combination) are permitted or not. The SOP also states specific raw material ingredients that are not permitted or are only permitted with a derogation. The SOP furthermore states permitted levels of unavoidable impurities.

SOP 048: Raw Material/ Packaging Selection and Supplier Approval Procedure

Star Brands also approves raw material suppliers. The company requires that there is a primary and secondary supplier on the database for each raw material. Each supplier is required to notify the Star Brands Technical Department (the buyer) about any changes related to the raw material supplied by completing or reviewing the respective Chemicals Questionnaire (CHQ.F001). Any changes would be captured in the site's raw material database. This database list all active, approved raw materials alongside SDSs, raw material specifications and the latest completed Chemicals Questionnaire.

Prospective raw material suppliers are required to complete and return the Chemical Questionnaire (CHQ.F001) and Supplier Questionnaire (new suppliers only) (SUPQ.F001) forms. Star Brands prohibits the use of chemicals that are not sourced from approved suppliers. Star Brands also requires supporting technical data for raw materials to be supplied, including the SDS, specification and allergen list (for fragrances).

Star Brands only grants approval to prospective chemicals and suppliers that satisfy corresponding criteria.

Once the questionnaires have been approved, the corresponding SDS and specification are reviewed for suitability for use and compared against those provided by other suppliers to select raw materials which optimise sustainability.

Selected suitable raw materials are assessed via the Human and Environmental Risk Assessment (HERA) process using Form 094.

SOP 003: Raw Material Data Management

For legal, quality, safety and sustainability reasons, it is necessary to ensure that the critical data on raw materials is kept up-to-date and reviewed periodically.

Raw material suppliers are required to notify Star Brands of any changes to the raw material supplied. Where changes arise, the chemical questionnaire (CHQ.F001) is required to be updated and resubmitted for approval.

This SOP requires that the Chemicals Approved Supplier List (SUP.F002) is maintained by the technical Department. Entries on this list are required to be reviewed at least every two years by the Technical, Materials and Purchasing Departments. These reviews are required to include documents such as the SDS, raw material technical specification, active raw material inventory and chemical questionnaire. Reviews are also required when there is a change or update from the supplier or a change to the product.

Findings of document reviews are required to be recorded as internal audits.

External audits

Star Brands is monitored and approved by a number of external organisations. The company is regularly audited by the British Retail Consortium and holds their AA grade approval, the highest level available.

Star Brands is also regularly audited by SEDEX. SEDEX undertakes SMETA audits, assessing the company's performance in areas of Labour Standards, Health and Safety, Environment, and Business Ethics.

Products are also monitored and checked against an external benchmark by the organisation Eurofins. The benchmarking typically focuses on performance attributes (e.g., cleaning efficacy, stability, sensory properties) and/or compliance with regulatory requirements. Eurofins uses recognized testing

methodologies, such as ISO standards or industry-specific protocols (e.g., AISE for detergents), to ensure reliable and consistent comparison.

5.1.2 Raw material inventory and consumption

Star Brands' raw material inventory is continuously updated to reflect annual production planning, chemical supplier selection and approval, raw material review and new raw material selection and approval. For the purpose of the permit variation application, a summary of all raw materials used during 2024 has been presented in Table 2. The raw material grouping and unique raw material code used by Star Brands has been used. In each group the materials have been sorted in accordance to the physical and environmental hazard statements with the most hazardous materials stated at the top of each group. The hazard statements are in line with the Globally Harmonised System on the Classification and Labelling of Chemicals (GHS).

Table 2 Raw material inventory and 2024 annual consumption

Star Brands Raw material group and code	Largest container on site	Annual consumption (t)	Storage location	Hazard statements (physical and environmental)
Raw materials production				
CWA – Solvents/ Flammables				
CWA504	IBC	100	Outside Unit 29	H225 – highly flammable liquid and vapour
CWA513	IBC			
CWA506	IBC	50	Outside Unit 29	H226 Flammable liquid and vapour.
CWA514	IBC	90	Unit 29	No physical or environmental hazard statement
CWA516	IBC			
CWA505	IBC	300	Unit 29	Not classified under CLP
CWA507	IBC			
CWA517	IBC			
CWB – preservatives and biocides				
CWB815	IBC	80	Unit 29	H226 Flammable liquid and vapour. H400 Very toxic to aquatic life. H411 Toxic to aquatic life with long lasting effects.
CWB816	IBC	70	Unit 29	H400 Very toxic to aquatic life.
CWB829	IBC			H410Very toxic to aquatic life with long lasting effects.
CWB823	IBC	<20	Unit 29	H410 Very toxic to aquatic life with long lasting effects.
CWB834	IBC			
CWB826	IBC	80	Unit 29	No physical or environmental hazard statement
CWB833	25kg bags			

Star Brands Raw material group and code	Largest container on site	Annual consumption (t)	Storage location	Hazard statements (physical and environmental)
CWB832	IBC	20	Unit 29	H411 Toxic to aquatic life with long lasting effects
CWD - Surfactants				
CWD249	IBC	6		H400 Very toxic to aquatic life. H411 - Toxic to aquatic life with long lasting effects
CWD284/ CWD287/ CWD302/ CWD331	Bulk tank 30,000 kg - CWD302; IBC – CWD 284, 287, 331	1100		H400 Very toxic to aquatic life. H412 -harmful to aquatic life with long lasting effects
CWD242	IBC	10		H411 Toxic to aquatic life with long lasting effects
CWD265/ CWD334	Bulk tank 30,000 kg CWD265; IBC -CWD334	2700	Unit 29 IBC Unit 21 Bulk tanks	H412 - harmful to aquatic life with long lasting effects
CWD272	IBC			
CWD295	IBC			
CWD321	Bulk tank 30,000kg			
CWD308	IBC	24	Unit 29	No physical or environmental hazard statement
CWD309	IBC			
CWD312	IBC			
CWD232	200 kg drums	360	Unit 29 IBC Unit 21 Bulk	Not classified under CLP
CWD304/1	Bulk tank 30,000kg			
CWD328	Bulk tank 30,000kg			
CWE – Fragrances				
CWE782	25 kg drum	0.02	Unit 29	H226 Flammable liquid and vapour. H411 Toxic to aquatic life with long lasting effects.
CWE944	100 kg drum	13	Unit 29	H410 Very toxic to aquatic life with long lasting effects.
CWE965	IBC			
CWE967	IBC			
CWE707	200 kg drum	150	Unit 29	H411 Toxic to aquatic life with long lasting effects
CWE708	IBC			
CWE729	25kg drum			
CWE745	200 kg drum			

Star Brands Raw material group and code	Largest container on site	Annual consumption (t)	Storage location	Hazard statements (physical and environmental)
CWE758	195 kg drum			
CWE760	200 kg drum			
CWE800	25 kg drum			
CWE827	195 kg drum			
CWE842	200 kg drum			
CWE844	200 kg drum			
CWE884	25 kg drum			
CWE885	200 kg drum			
CWE888	25 kg drum			
CWE897	25 kg drum			
CWE922	25 kg drum			
CWE926	25 kg drum			
CWE938	IBC			
CWE940	100 kg drum			
CWE945	100 kg drum			
CWE953	100 kg drum			
CWE955	25 kg drum			
CWE963	200 kg drum			
CWE964	200 kg drum			
CWE966	900 kg drum			
CWE968	200 kg drum			
CWE970	900 kg drum			
CWE971	100 kg drum			
CWE974	IBC			
CWE976	100 kg drum			
CWE979	190 kg drum			
CWE980	200 kg drum			
CWE981	190 kg drum			
CWE982	195 kg drum			
CWE983	185 kg drum			

Star Brands Raw material group and code	Largest container on site	Annual consumption (t)	Storage location	Hazard statements (physical and environmental)
CWE878	190 kg drum	9	Unit 29	H412 -harmful to aquatic life with long lasting effects
CWE879	25 kg drum			
CWE911	25 kg drum			
CWE928	IBC			
CWE954	100 kg drum			
CWE972	100 kg drum			
CWE975	195 kg drum			
CWE973	100 kg drum	<1		No physical or environmental hazard statement
CWF - Soaps				
CWF106	25 kg bags	4		Not classified under CLP
CWM – Polymers/Inorganics				
CWM976	IBC	20	Unit 29	H412 -harmful to aquatic life with long lasting effects
CWM946	IBC	28	Unit 29	No physical or environmental hazard statement
CWM904	25 kg bags	1400	Unit 29	Not classified under CLP
CWM929	IBC			
CWM950	25 kg bags			
CWM951	IBC			
CWM953	25 kg bags			
CWM954	25 kg bags			
CWM961	25 kg bags			
CWM962	IBC			
CWM971	25 kg bags			
CWM973	IBC			
CWM975	IBC			
CWT - Dyes				
CWT645	5 kg bags	10	Unit 29	H412 -harmful to aquatic life with long lasting effects
CWT620	25 kg bags	75	Unit 29	No physical or environmental hazard statement
CWT613	1 kg bags	6	Unit 29	Not classified under CLP

Star Brands Raw material group and code	Largest container on site	Annual consumption (t)	Storage location	Hazard statements (physical and environmental)
25% - CWT615	25 kg bags			
CWT616	1 kg bags			
CWT617	5 kg bags			
CWT622	5 kg bags			
CWT636	25 kg bags			
CWT643	5 kg bags			
CWT650	1 kg bags			
CWT654	25 kg bags			
CWW – Agents – brighteners etc				
CWW413	IBC	290	Unit 29	H410 Very toxic to aquatic life with long lasting effects.
CWW510	IBC	65	Unit 29	H412 -harmful to aquatic life with long lasting effects
CWW403	IBC	160	Unit 29	No physical or environmental hazard statement
CWW430	IBC			
CWW466	25 kg bags			
CWW502	25 kg keg			
CWW511	IBC			
CWW512	25 kg pail			
CWW507	20 kg pail			
CWW404	25 kg bags	1050	Unit 29	Not classified under CLP
CWW467	25 kg bags			
CWW478	25 kg bags			
CWW486	25 kg drum			
CWW489	200 kg drum			
CWW503	50 kg drum			
CWX - Additives				
CWX340	IBC	2	Unit 29	H411 Toxic to aquatic life with long lasting effects
CWX303	IBC	1000	Unit 29	No physical or environmental hazard statement
CWX310	25 kg bags			
CWX317	IBC			

Star Brands Raw material group and code	Largest container on site	Annual consumption (t)	Storage location	Hazard statements (physical and environmental)
CWX318	IBC			
CWX323	277 kg drum			
CWX326	120 kg drum			
CWX333	IBC			
CWX336	IBC			
CWX338	IBC			
CWX339	IBC			
CWX311	IBC	100	Unit 29	Not classified under CLP
CWX322	IBC			
CWX337	IBC			
Ancillary materials				
Maintenance consumables (adhesives, contact cleaner, lubricants, grease, sealant	Various small containers including aerosol cans, metal and plastic tubs, spray bottles, largest is 5l plastic container	<0.1	Maintenance COSHH cabinet	H225 – highly flammable liquid and vapour H226 - flammable liquid and vapour.
Absorbent rolls and spill kits	Rolls and packs	6	Various locations around the site	Not classified under CLP
DI chemicals	IBC	4	Blending platform	H290 may be corrosive to metals
Packaging materials - card	pallets	3000	Unit 15	Not classified under CLP
Packaging materials - plastic	Pallets/ cardboard boxes	5000	Unit 15	Not classified under CLP

5.2 Water

5.2.1 Sources and consumption

The site is connected to the mains water supply. Each Unit has a separate water meter, allowing the measurement of the amount consumed per Unit. A significant amount of water is retained in the product. Electronic data collection that commenced in 2025 identified that, on average, 75% of liquid products by weight is water.

Some of the products require deionised water as a raw material. Deionised water is produced on site in the IX plant described in Section 4.4.4.

Water consumption, KPIs and trends are recorded and monitored by the Continuous Improvement Team and Quality Control. Annual water consumption by the liquid product department is reported annually in line discharging Condition 4.2.2 of the current SR 2009 No2 permit.

Table 3 sets out the total water consumption and specific water consumption for the installation, i.e., the liquid products department only, during the 2023 and 2024 calendar years. As noted above, about 75% of the water supplied for production is retained in the finished liquid products. Therefore, water consumed for manufacturing purposes that does not remain within the product is approximately 25% of total water supplied.

Table 3: Water Consumption in 2023 and 2024

Performance indicator	2023	2024
Water consumption liquid products total including retained water in product (regulated process Units 17, 19, 21, 23 and 29)* [m^3]	62,560	71,400
Water consumption liquid products manufacturing process (regulated process Units 17, 19, 21, 23 and 29) [m^3]	15,640	17,850
Production volume liquid product department [tonnes]	74,137	77.757
Specific water consumption [m^3/tonne of product]	0.84	0.91

* From annual report in line with requirements of SR2009 No2

Whilst production water consumption and specific water consumption increased from 2023 to 2024, it should be noted that there are uncertainties and other variables influencing the numbers presented. The main uncertainty is associated with water consumption data based on meter readings. 2023 monthly meter reading records noted six incidents of faulty/replacement meters, which will have affected the accuracy of overall figures for annual water consumption. This was reduced to three occasions of faulty/replaced water meters during 2024.

The key other variable influencing the accuracy of the specific water consumption figure is associated with the variety of products that contribute to the liquid product breakdown for each year. Therefore, there maybe have been a higher overall production figure for concentrates or gels with less entrained water in 2023 compared to 2024.

These shortcomings in data quality have been recognised by Star Brands and a better way of recording water consumption and production volumes and types is being implemented, enabling faster future analysis of performance indicators, including specific water consumption.

5.2.2 Water efficiency measures and review

Process water - Product water

Where safe and appropriate to do so, Star Brands' NPD team seeks to employ more concentrated raw materials and develop more concentrated products. This aims to improve efficiency and reduce the need to transport water.

A process has been introduced to reuse detergents and gels that would have previously gone into the waste stream. Small volumes of 'secondary' product are stored in the off-site warehouse until the product is next on the manufacturing schedule. Secondary product is then returned and added in small quantities, in agreement with the quality department, to new batches of the product. When applied, this leads to a small reduction in water usage.

Process water - Cleaning water

Cleaning water consumption is minimised by scheduling production in a manner where products from the same product group are run in a sequence. Scheduling seeks to avoid the generation of wastewater by reusing rinsing water as part of the next product batch. Please see also Section 4.2.4 for further detail of cleaning procedures.

Cleaning effluent is not currently segregated and re-used in the process due to changes to product quality protocols and customer expectations. Furthermore, due to the increased production levels a considerably greater volume of cleaning water is now produced. The infrastructure needed to enable storage and treatment prior to re-use on site is not feasible due to a lack of space at the site.

Wastewater recycling

Collection of uncontaminated stormwater runoff (roof runoff), treatment and subsequent use in the manufacturing process has not been implemented on site for similar reasons as mentioned above for cleaning wastewater.

Water efficiency improvement programme

At the time of this application, two improvement projects were in the capex requisition stage associated with water supply security and deionised water quality:

1 A large water storage tank (80m^3 storage capacity)

This proposed new tank would provide a buffer should there be supply restrictions in the future. In addition, the new storage tank would enable the site to deliver water at the correct pressure through the RO process while serving other water users at the same time. This would enable the RO plant to perform as intended, rather than dropping out of a water purification cycle when the water pressure drops due to demand elsewhere on the site. These interrupted RO cycles lead to significantly higher water consumption than is achievable for this plant as after each interruption a backwash cycle commences with water being consumed and wastewater being released to sewer.

2 Replacement process water treatment plant

It is proposed the current RO and XI plants would be replaced with a new plant comprising a duplex water softener pretreatment unit followed by a duplex RO system. This system would be rated at 7,500 litres per hour and would operate in duty/assist configuration.

Both improvement projects are going through internal CAPEX approval processes at the time of the variation application and a completion date is not currently available.

5.3 Waste

5.3.1 Waste streams and volumes

A ‘Waste organisation and responsibilities’ spreadsheet provides an overview of the site’s waste streams and second grade products, who is responsible for management and details of the contractor engaged to remove the waste.

Table 4 provides details of waste streams, hazardous/non-hazardous classifications, volumes and fates associated with the regulated activity. Total waste data from the facility for 2024 were analysed to ascertain whether the waste was associated with the regulated process or not, as there are process activities not directly associated with the regulated activity. This sorting process mainly consisted of separating the liquid processes and products from the dry, powder processes. No further delineation has been possible and all liquid mixed detergent waste, spill kit waste, general waste and recyclates (card, plastic, metal wood) are included in the figures in Table 4. This is considered a conservative approach.

Baled card and plastic from Dunlop Road activities are removed for off-site recovery.

Table 4: Waste streams from the regulated activity

Waste stream	EWC codes	Annual tonnage (2024)	Classification	Fate
Surplus out of date raw materials e.g. bleach, surfactants, fragrances, colours, dyes	16 03 03 16 03 05	12	Hazardous	R13, D9
Bleach and bleach washings (blending vessel clean down option 5 wastewater)	06 02 04 06 02 05	60	Hazardous	D9, D15
Diluted peroxide and Peroxide washings (blending vessel clean down option 5 wastewater)	16 09 03	5	Hazardous	D9, D15
Contaminated absorbent pads/ spill kit material	15 02 02	2.5	Hazardous	R13, D15
Detergent washings (all other blending vessel clean down waste water)	16 10 02 16 03 06	1,000	Non hazardous	R13
Empty containers (drums, IBCs)	15 01 04, 15 01 02, 15 01 05	115	Non hazardous	R3, R4, R5
General waste	20 03 01	200	Non hazardous	R4, R5
Out of spec product	16 03 04	75	Non hazardous	D9
Surplus out of date raw materials e.g. antifoam, biocide, brightening agent,	16 03 04 16 03 06	1.5	Non hazardous	D9, D15
Metal	17 04 07	5	Non hazardous	R4
Wood including broken pallets	15 01 03	110	Non hazardous	R3
Cardboard baled	15 01 01		Non hazardous	R3
Carboard Loose	15 01 01			
Plastic film baled	15 01 02		Non hazardous	R3
Hessian Sacks	26 02 09		Non hazardous	R3
Mixed plastic film	15 01 02		Non hazardous	R3
Low grade plastic film	15 01 02		Non hazardous	R3

5.3.2 Waste management approach

The permit holder has implemented a site waste management standard (SB STD 016) for the manufacturing facility. This standard applies to the whole site and includes activities not regulated under the environmental permit.

In compliance with the Waste (England and Wales) Regulations 2011, as amended, the permit holder applies principles of waste management in accordance with the waste hierarchy. This includes taking reasonable measures to prevent waste and the application of the waste hierarchy to transferred or consigned waste.

Waste management responsibilities are clearly defined for managers, waste co-ordinators, employees, subcontractors and waste contractors. The relevant responsibilities are summarised in Table 5.

Table 5: Waste management responsibilities set out in waste management standard (SB STD 016)

Relevant Star Brands staff/ third party	Responsibilities
Manager	Implementing schemes that reduce waste, promote recycling schemes Reduce the use of single use materials Ensuring that all waste generated on site, or managed as a service on behalf of clients, is processed and/or disposed of according to the requirements of this procedure and relevant legislation. Appointing a suitable and competent person to act as a **Waste Coordinator,** this may be a third party. Provide instruction and training to the Waste Coordinator, cleaning staff and contractors to ensure they are aware of their responsibilities with regards to waste management. For hazardous waste ensure hazardous waste returns are received from the waste contractor treating this waste. Obtaining and signing annual waste transfer notes/annual waste consignment notes where these are provided for the site. This may be delegated to the Waste Coordinator as appropriate. Ensuring waste transfer notes are retained for 2 years on site and waste consignment notes are retained for 3 years
Waste Co-ordinator	Ensuring the proper coordination of waste management and setting up a suitable means to store waste records. Identifying waste streams and approved disposal routes. Obtaining the relevant Licenses/Permits from Client and the Carrier/Broker and Disposal Site licenses form the Waste Management Contractor. Monitoring, measuring and reporting on waste management figures and minimisation initiatives and providing feedback to the client. Obtaining and completing day-to-day duty of care documentation (waste transfer / consignment notes) during business hours. An internal review of waste storage, knowledge and transfer should be performed on a regular basis to ensure compliance is maintained and achieved. Any necessary actions should be recorded and tracked to completion using a workplace inspection form. Participating in the internal Audit programme Where a Company location receives hazardous waste generated by a Star Brands employee from other (e.g. customer) sites, then the necessary waste management permit or exemption must be obtained, and quarterly consignee submissions must be made to the relevant Environmental Regulator from that receiving station.
Employees	Reducing waste where possible and for recycling waste at the recycling facilities provided. General housekeeping and ensuring that no build-up of waste occurs in any area and for initial Storage of waste in suitable containers. Segregating waste into the correct categories, (hazardous waste, general non-hazardous waste or waste for recycling) and place into separate containers. When handling waste ensure (if necessary) the correct type of personal protection is provided and used. Waste awaiting collection should be kept secure and use appropriate signage and transported to the interface / waste area for agreed collection. Any required waste management training courses are attended.
Sub-contractors	Ensuring they follow site waste management procedures. Ensuring they are clear on what site waste streams, if any, they are permitted to use Ensuring all substances brought onto the premises by any contractor should be removed and disposed of by the same company.
Waste contractors	Removing and disposing of waste(s) in accordance with this procedure. Providing regular reporting and measurement on waste disposal figures (usually monthly).

The standard also provides instructions and guidance on:

- How to classify waste as hazardous or non-hazardous;

- How to deal with third party or contractor waste and construction waste;
- Waste documentation requirements;
- Waste electrical and electronic equipment (WEEE);
- The identification of raw material packaging that may require disposal as hazardous waste; and
- Guidance on common waste types such as asbestos, batteries, aerosol cans, toner cartridges, oils/lubricants/liquids, packaging waste for recycling, fluorescent tubes.

5.3.3 Waste management review

As stipulated in the site waste management standard (SB STD 016), the HSE Manager undertakes monthly reviews of the waste management system to ensure correct methods are being followed. Records are retained and data is used to inform KPIs and compliance evaluation.

Duty of care checks are to be completed on an annual basis which should ideally include a site visit as well as performing a paper trail audit.

Completed audit and review records are filed in the management system – waste folder if no further action is required. Should actions be raised, implementation and progress would be tracked through daily management meetings.

6. Energy consumption and efficiency

6.1 Energy consumption

There are two energy sources at the site: natural gas and electricity from the national grid. Consumption figures for 2023 and 2024 for the liquid product manufacture are summarised in Table 6 for Units 17, 19, 21, 23 and 29.

Energy consumption is monitored and recorded. Annual consumption and specific energy consumption data for the Installation (i.e., liquid product department only) are reported to the Environment Agency annually to satisfy the existing permit.

Table 6: Energy consumption at Star Brands' Dunlop Road site in 2023 and 2024

Energy source	Primary energy [MWh]		Specific Usage [MWh per tonne of product]	
	2023	2024	2023	2024
Natural gas	3272	2629	-	-
Electricity	1188	1267	-	-
Total energy consumption	4460	3896	0.06	0.05

As can be seen total energy consumption at the site is still relatively low and would still satisfy the Low Impact Intallation criteria as shown in annual reports submitted for 2023 and 2024.

6.2 Energy efficiency

Energy consumption and associated CO_{2e} emissions (in terms of carbon dioxide equivalent) are KPIs monitored under the AISE Charter for Sustainable Cleaning. Energy consumption and associated carbon dioxide emissions are reported annually to the AISE Scheme administrators.

Projects are regularly undertaken to improve energy efficiency. This includes projects to replace less efficient equipment. Proposed and recent initiatives are set out below:

- Replacement of office and production lighting with LED lighting as and when areas are refurbished or existing lighting required significant repair (ongoing);
- Emergency lighting and fire alarm replaced with energy efficient systems;
- Motor control using inverters – rolling programme;
- Compressors are on frequency drives – rolling programme;
- Air leak surveys on compressed air system and programme repairs – ongoing project;
- Replacement of steam generating plant (planned, subject to ongoing CAPEX request). Replacement plant would be a shell style system which will hold a body of steam at all times. This would improve overall steam quality and delivery control and increased combustion efficiency;
- Replacement of the existing warm room in Unit 19 with a new, better insulated electrically heated warm room in Unit 29 with improved temperature control (completed);
- Replacing the water treatment plant (planned, going through CAPEX request). Changing from two plants (the IX and RO plants) to a single new water softener duplex RO plant (see section 5.2) This project cannot proceed until the water storage tank and associated new ring main project are complete so that these can provide the water pressure required for efficient operation of a new RO plant.

- Use of waste heat from other compressors for workplace heating (ongoing).
- Use of additional heating capacity for offices and showers, as a result of reduced hot water demand for blending and cleaning in Unit 23 (ongoing). This was possible through the use of thermostatic mixing values for temperature modulation.

7. Emissions and monitoring

7.1 Point source emissions to air

7.1.1 Emissions identification and control

There have been and will be no changes to the emissions to air from the installation as a result of this variation.

There are no point source emissions to air from the regulated process, whether from delivery, storage and use (blending process) of raw materials, cleaning and filling activities apart from occasional emissions of excess steam from the two steam tunnels (A1 and A2) on filling lines 3 and 4.

The duration of the emissions from A1 and A2 are controlled through temperature controls in the steam tunnels. If the set temperature required for shrinking the sleeves onto the bottles is exceeded the valves open and excess steam is released to atmosphere via the ductwork in place. Due to the steam generation plant running at full fire continuously when both steam tunnels are in use, temperature control in the steam tunnel is the main control feature. This is described in further detail in in section 4.3.2.

There are combustion emissions to air from the gas fired steam generation plant outside Unit 17 and hot water boiler in Unit 19 (A3 and A4).

Breather valves at the bulk storage tanks release air back into Unit 21, rather than venting externally. LEV and vacuum cleaner systems deployed in cream cleaner mixing enclosure exhaust back into Unit 21.

There is no active air management on any of the production or raw material storage units and the buildings rely on natural ventilation.

The locations of emission points A1 to A4 are shown on plan in Appendix B.

7.1.2 Emissions Characterisation and limits

Normal operating conditions

Emissions characterisations for points A1 to A4 are set out in Table 7.

A1 and A2 emissions are ducted to atmosphere via two vents. Stack for A1 terminates just above the roof level and A2 stack protrudes from the southeast facing side wall of Unit 17. There is no forced flow at either outlet.

Steam generation plant stack (A3) is attached to the northeast facing gable end of Unit 17 and protrudes by less than 3 m above the eaves of the roof, whereas hot water boiler stack (A4) protrudes just above the roof level in Unit 19.

Table 7: Emissions characteristics for points A1 through A4 under normal operating conditions

Emission point reference	Source	Parameter	Concentration
A1	Steam release on steam tunnel Line 3	Steam/ water vapour	N/A
A2	Steam release on steam tunnel Line 4	Steam/ Water vapour	N/A
A3	Steam generation plant outside Unit 17	Products of natural gas combustion	please see annual service reports
A4	Hot water boiler Unit 19	Products of natural gas combustion	Please see annual service reports

There are no emission limits set out in the applicable guidance for emissions from points A1 to A4.

Steam and hot water boiler plant are in aggregate below 1MWth input capacity and hence do not attract the emission limits set out in the Medium Combustion Plant Directive (MCPD) (EU) 2015/2193 as implemented in the Environmental Permitting (England and Wales) Regulations 2016, as amended.

Other than normal operating conditions (OTNOC)

The emission characteristics under OTNOC for A1 and A2 emissions are no different than what is listed in Table 7 above. The emissions would only ever constitute water vapour. The only parameter that may change would be the length of the emission taking place. Steam is emitted from A1 and A2 to control (reduce) the temperature in the steam tunnels until this is appropriate for sleeve heat shrinking. Uncontrolled emissions of steam would not occur because any malfunction in the temperature detection or control system would lead to a stop of the filling lines and once the line stops there would be no more call for steam from the steam generation plant.

Boiler and steam plant operation is checked on a daily basis and plant is inspected and serviced by a competent contractor under a maintenance contract. Should incomplete combustion conditions arise, emissions of CO and fuel consumption would be expected to increase. This would be detected via defective temperature control where the steam is required (the sleever tunnel).

7.2 Fugitive emissions to air

7.2.1 Introduction

There are fugitive emissions to air through natural building ventilation with the following sources inside the building:

- Blending vessel loading, blending and filling processes;
- Bulk tank breather valve emissions via natural building ventilation; and
- Residual emissions from bag filter servicing the LEV and vacuum in the cream cleaner enclosure via the natural ventilation of the building.

7.2.2 Blending vessel loading and blending process, filling lines

Raw materials that are classed as Volatile Organic Compounds (VOCs) are only added when there is a sufficient liquid level in the blending vessels to introduce the VOCs below the liquid surface with the mixing blades operating. The neutralisation reactions do not generate fugitive emissions.

If raw material supply is not piped in directly from the bulk tanks, it is added through a small hatch in the blending vessel lid. For transfers from an IBC, a flexible hose is used with solid section of pipe attached and secured to the IBC and the blending vessel. This allows for liquid to be removed from the IBC and introduced the blending tank safely without splashing and facilitates additions below the liquid level in the blending tank.

Powdered raw materials for the cream cleaner, are added through the lid hatches of the two dedicated blending vessels. These hatches are served by LEV systems that control particulate emissions arising during bag emptying. Any spillages would be captured and removed through a vacuum cleaning system.

No health and safety concerns, in particular as a result of COSHH assessments, have been identified with respect to any of the raw materials being added into the blending vessels or from the bottle filling processes. This can also be interpreted as concluding there is sufficient control of any fugitive emissions from the blending process. As a result, there no concerns regarding environmental impact of fugitive emissions from blending and filling processes.

7.2.3 Bulk tank breather valve emissions via natural building ventilation

None of the materials stored in the bulk tanks are classed as a VOC as per definition set out in the Industrial Emissions Directive (IED) 2010/75/EU, as implemented into UK law through the Environmental Permitting (England and Wales) Regulations 2016, as amended. This definition is set out in Article 3(45) to the IED:

" 'volatile organic compound' means any organic compound as well as the fraction of creosote, having at 293,15 K a vapour pressure of 0,01 kPa or more, or having a corresponding volatility under the particular conditions of use;…"

Vapour pressures of the bulk tank raw materials are summarised in Table 8.

Table 8: Published vapour pressure data for raw materials stored in bulk tanks

Material	Star Brands ID	Vapour pressure [kPa]	Source
SLES	CWD265	2.4E-17 @25°C	pubchem.ncbi.nlm.nih.gov/compound/Sodium-Laureth-Sulfate#section=Environmental-Fate
Alcoholethoxylate C13 to C15	CWD302	5.7E-05 @25°C	HERA Human and Environmental risk assessment on ingredients of European household cleaning products – alcohol ethoxylates, VS 2, 09-2009
Dipalmitoylethyl Hydroxyethylmonium Methosulfate (MB)	CWD304/1	3.43E-10	comptox.epa.gov/dashboard/chemical/properties
Dodecyl Benzene Sulphonic Acid NB Low 2-phenol	CWD321	1.6E-09 @25°C	https://echa.europa.eu/registration-dossier/-/registered-dossier
Oleic acid	CWD328	7.3E-08 @25°C	https://pubchem.ncbi.nlm.nih.gov/compound/

All bulk raw materials record vapour pressures between 2 to 15 orders of magnitude lower than the threshold deemed to constitute a VOC as defined in the IED. Therefore, no further assessment of fugitive emissions to air from the breather valves is considered necessary.

7.2.4 Residual emissions from LEV and vacuum in the cream cleaner enclosure

Both the LEVs and the vacuum system used to remove loose or spilled cream cleaner powdered ingredients are fitted with particulate filters. The filtered air is released back into the building and is understood not to present any health and safety concerns, and which can also be interpreted as sufficient control of any fugitive emissions from the cream cleaner blending process. As a result, there no concerns regarding environmental impact of fugitive emissions.

7.3 Point source emissions to sewer and controlled waters

7.3.1 Point source emissions to sewer

Normal operating conditions

Since the LII permit was issued in 2016, production volumes in the liquid products department have increased and so has the volume of effluent requiring discharge. The current trade effluent discharge consent (TEDC) (Severn Trent ref No 007530V, issued in 2010) for effluent 'derived from blending of water-soluble cleaning products' included a 24 hour volume limit and discharge rate that were too low for the production processes. A decision was taken to transfer all blending vessel cleaning effluent to IBCs and to remove it from site as a liquid waste, rather than explore the increase in discharge volumes and rate.

Now, under normal operating conditions, the only effluents released to sewer at points SW1 and SW2 are the following:

- **SW1** – RO and XI plant reconditioning back wash water, miscellaneous small discharges from Units 17, 21 and 23 floors and equipment cleanup activities in Unit 21, 23 and 17 via the pump room floor under TEDC 007560V.
- **SW2** - Discharge of effluent derived from blowdown water from steam generator and some backwash from water softener plant (Severn Trent Water (STW) authorisation for small volume discharges ref 07108SVL)

The location of SW1 has remained the same and the steam generation plant discharges are via SW2. Locations have been shown on site plans in Appendix B.

The concentration of the effluent released to sewer at SW1 has significantly reduced since the TEDC was issued. Clean down wash waters are no longer discharged. XI and RO back wash water is considered to be of low strength, as it comprises concentrated tap water. Ad hoc compliance sampling has continued by STW but due to the reduced and intermittent nature of the discharge there has only been one occasion where a sample was taken successfully since 2020, Analysis results for the successful sample are presented in Table 9:

Table 9: TEDC compliance sampling results since 2020

Severn Trent sample date	Determinand	Sample result	TEDC limit
02/02/2024	COD expressed as O	2020.0 mg/l	5000 mg/l
	pH	8.2	6-10
	SS	7.0 mg/l	400 mg/l

Although the effluent currently discharged via SW1 is covered by the current TEDC, the operator is in the process of characterising the effluent in detail and amend the consent to reflect the reduction in effluent strength and to satisfy STW requirements.

Effluent from SW2 is not sampled. Effluent discharges to SW2 have been deemed a small volume, low risk discharge by STW. Effluents discharged comprise condensed steam and concentrated tap water.

OTNOC

A failure or leakage from the connections or flexible hoses between the blending vessel outlets and the filling line inlets in the pumproom may pose a potential for small volumes of product or cleaning wastewater to be released to sewer via SW1.

Control measures to prevent unauthorised discharge of effluent to sewer are as follows:

- **For product transfer**

  Flexible hose failure or decoupling from flow plate connection points would be identified at the connected filling line header tank by a fall in pressure. The connected blending tank valve would be closed immediately by one of the two filling line operators and spill kits would be deployed to contain and dispose of spilt material.

- **For clean down wastewater**

  Flexible hose failure or decoupling from flow plate connection points would be noticed and responded to instantly. This is because the process is manned by an operator and any OTNOC would be rectified by closing the valve at the flow plate blending tank outlet.

  Although there is a risk of spilt material leaving site via SW1, the volumes are considered to be very small and risks of potential impacts on 'STW's wastewater treatment plant (WWTP)

operation or final discharge quality are considered low. This low risk was determined considering the volume, nature and composition of clean down wastewater arising at the site.

7.3.2 Point source emissions to controlled waters

There are no point source emissions to controlled waters at the site under normal operating conditions or OTNOC.

7.4 Fugitive emissions to sewer and controlled waters

7.4.1 Introduction

There are no fugitive emissions to sewer. All site yard drainage goes to the public surface water drain and discharges to Wixon Brook southeast from the site boundary. The surface water drainage receiving all the yard and roof surface water runoff also directly serves the nearby residential area of Brookfield Close.

7.4.2 Fugitive emissions to controlled waters under normal operating conditions

Under normal operating conditions the yard and roof water runoff from the site constitutes clean uncontaminated stormwater. There are potential sources of contamination as follows:

- Bulk raw material delivery;
- Non bulk raw material delivery and removal for the just in time method of production;
- Transfer of non-bulk raw materials between Units 21 and 29 using electric FLTs;
- Product despatch;
- Waste pickups; and
- HGV traffic on the yard.

Due to the storm drain being a public drain and the site being leased from a landlord, options to install physical pollution control measures are limited. Example measures would consist of an interceptor type retention system or the isolation of the yard drainage system by means of a pen stock valve or similar.

The site has instead implemented numerous procedural control measures which include the following:

- Use of a logistics software (GoRamp) to schedule all vehicle movements, including all raw material, products and waste;
- Volumes of chemicals held on site are kept to a minimum. There are five bulk tanks at the site. The volume of the other 128 chemicals held at the site at any one time is restricted to what is required for the next 48 hours of production with a maximum container size of 1000l (IBC);
- Procedures to ensure that all suppliers meet minimum vehicle conditions prior to arriving on site and strict checks on arrival;
- A detailed bulk delivery procedure including the deployment of drain covers and flexible hose covers to minimise the potential for any spills to enter surface water drainage. Fixed low speed pump transfers are undertaken to bulk tanks to avoid potential issues associated with high speed transfer;
- Delivery procedure for non-bulk materials including checks of the condition of the containers while they are still on the vehicle and transfers onto IBC or pallet mobile bunds in case damage is discovered during unloading;

- Use of regularly maintained FLTs and competent operators when transferring raw materials between Unit 29 to 21;
- An electronic chemical inventory that is updated continuously, use of handheld scanners and label system to update information on non-bulk containers to manage potential recall of part-used containers, manage quality control and deliver raw material traceability for products; and
- Spill kits are located across the yard and inside the Units at strategic positions. The contents of kits are monitored and replenished frequently.

7.4.3 Fugitive emissions to controlled waters under OTNOC

Fugitive emissions to controlled waters are considered to be mainly as a result of accident and emergency scenarios such as for example:

- Loss of containment inside Units 21 and 29 from bulk tanks, blending tanks, transfer pipework;
- Accidental loss of containment during material/ product and waste delivery and despatch;
- Fire water; or
- Surface water flooding.

The identification, assessment, significance evaluation and assignment of control measures for these accident and emergency aspects are set out in the company's aspects and impacts register developed as part of the EMS.

Table 10 summarises the control measures in place to reduce potential environmental impacts from the accident and emergency scenarios identified.

Table 10: Control measures for foreseeable accident and emergency scenarios with controlled water impact potential

Accident emergency scenario	Control measures	Document reference
Loss of containment in Unit 29	Secondary containment barriers in place during non-operational hours	SP.023 – Spill procedure SOP.026 – Tanker off-loading SB STD 005 – Material and storage pollution prevention SB STD 065 Safe Storage of Chemicals Business continuity plan Daily inspection sheets (ENGXXXX) Appendix E ENG0002 – Steam Gen Daily ENG0004B – site boilers daily ENG9002 – DI Unit daily ENG9008 Tank E ENG9024 – Bulk Tank 2 etc
Loss of containment in Unit 21	Bulk delivery procedure – pre-fill capacity checks, lock-off system, pumped instead of blow in Secondary containment barriers in place to isolate the blending area during non-operational hours and during bulk tank deliveries No internal drains and impermeable floor Internal bunds/ kerbs in place to prevent spillage moving onto walkways and into other Units Frequent inspections of condition of pollution prevention measures and primary containment integrity	

Accident emergency scenario	Control measures	Document reference
Loss of containment in the yard	Up to date drainage plans and periodic drainage surveys to ascertain condition of drains Drainage systems in good working order Drain covers in place during bulk deliveries, drip trays under connection points, protective ducting sleeve placed over flexible hose Supervised deliveries of bulk and non-bulk materials No storage of raw materials outside (except one or two IBCs containing flammables) on pallet bunds Supervised loading of waste and product Strategic placement of spill kits, regular monitoring and restocking of kits Spill procedure and trained emergency spill team	SOP.026 – Tanker off-loading SB STD 005 - Material Handling & Storage – Pollution Prevention SOP.023 – Spill procedure Business continuity plan
Fire	Raw material selection and review Inventories of flammable raw materials are managed to keep them to a minimum, including through the 'just in time' logistics system Storage of one or two highest risk flammable material IBCs outside and only brought to Unit 21 when immediately required for production Use of air pumps for material transfer Introduction of flammables below liquid level while mixers are active, minimising the potential for generation of critical VOC or mist clouds.	SOP.048 – Raw material/ packaging selection and supplier approval SOP.191 - Warehouse chemical goods in procedure SB STD 065 - Safe Storage of Chemicals Business continuity plan
Surface water flooding of the site	Minimise the amount of flammable raw materials stored in the yard to a minimum as part of the 'just in time' logistics system Place secondary containment barriers so flood water is restricted from entering Units 29 and 21	Business continuity plan

7.5 Odour

Numerous different fragrances and VOCs are used in the blending process and handling of these materials presents a source of potential odour emissions. The process is undertaken at ambient temperatures and atmospheric pressure inside the building with no open or external storage of raw materials, products or waste, with the objective of reducing any fugitive emissions to a minimum.

Odours could arise as fugitive emissions from building openings in Unit 17, 21 and 23 where the raw materials are decanted, weighed and added to the blending vessels in small volumes, with the final product blends being transferred to product bottles at the filling lines. There is no active air management in the building and no extraction on any of the blending vessels or filling line machinery.

Emissions from A1 to A4 are not odorous.

Although odour emissions would likely to be present during operational hours inside the Units, these only pose a fugitive emissions risk if the doors and windows are kept open for an extended period.

The intensity of any odour emissions from the process is considered to be low due to the small volumes of fragrances handled at any one time and VOC emissions being minimised as described in Section 7.1 above.

The types of odours generated from the blending activity are considered to be less offensive (pleasant hedonic tone). It is understood there are no health and safety concerns at the site associated with the handling and use of odorous materials. The fragrances added have been chosen based on market research and have been approved for use in household products. The fragrances are added to the products to increase the customer experience through a pleasant hedonic tone.

7.6 Monitoring

7.6.1 Emissions to air

There are no current monitoring arrangements for point source emissions to air for emission points A1 to A4. There are no emission limits set under the existing permit, as discussed above, and no independent stack monitoring is proposed for these emissions going forward.

Steam generation plant and hot water boilers are serviced regularly and combustion efficiency is checked. Any issues with abnormal emissions due to incomplete combustion would be addressed at the time of servicing or repair.

7.6.2 Emissions to sewer and controlled water

Emissions to sewer

At the time of this application, Star Brands was in the process of reviewing their TEDC with STW. This review will include sampling and characterisation of the effluent now being discharged via SW1.

The ongoing monitoring arrangements will be updated to reflect requirements under any revised TEDC. This may include continuation of continuous monitoring of wastewater flow and pH checks when discharging. The monitoring of discharge temperatures, although consented, is not considered necessary as the temperature of the discharge would be consistent with mains water temperatures (RO back wash) with no possibility of this reaching the standard TEDC temperature limit of 43°C.

Emissions to controlled waters

There are no point source emissions to controlled water and stormwater discharges are not monitored.

8. Noise and vibration

8.1 Noise and vibration sources

Overall, there is a low potential for noise nuisance from the site's activities as production and packaging operations are undertaken indoors.

There are noise sensitive receptors in close proximity to the site. These are located on Enfield Road to the southeast of the site and comprise mainly residential properties.

The main external noise sources on site as a result of or associated with the permitted activities are:

- Delivery and despatch traffic and associated loading and unloading activity by FLT;
- Break out noise from production noise in Unit 17, 21 and 23, mainly through door openings;
- Other yard activities especially during the night time;
- Noise from the steam generation plant.

A number of infrastructure, operational and equipment changes have been and are being implemented at the site. These include a new storage building next to the external steam generation plant, goods out building extension outside Unit 23, a silica four silo in yard outside Unit 25 (for non-permitted paste process) as well as extended operational hours and nighttime working. Therefore, the external noise environment and potential impact has changed since the original application.

A recent BS 4142 noise survey and assessment was undertaken by an external noise consultant in 2023. This assessment specifically measured operational noise generated by the two sets of externally located equipment: the steam generation plant and the silica flour silo. As the flour silo is outside the installation boundary, this process will not be considered further in this application.

Operational noise levels for the steam generating plant were surveyed and Table 11 summarises the results obtained.

Table 11: Operational noise levels: Steam generating plant

Measurement position	L_{Aeq} [dB(A)]	Survey observations - character of noise
1m from right louvre, 0.5m above ground	71	Steady nature of noise when operating at full duty changeable when ramping up and down which makes it more distinctive against the residual noise environment and hence more likely to attract attention especially during quieter night hours
NE elevation, 1m from left louvre, 0.5m above ground	70	
NE elevation, between louvres, 0.5m above ground	70	
NW elevation, 1m from centre, 1.5 above ground	73	
SW elevation, 1.5 above ground, between plant cabin and boundary screen	69	
SE elevation, 1m from fan louvre, 2m above ground	73	
SE elevation, 1m from low level discharge flue opening	74	
Inside cabin, moving average	80	
1m above cabin roof, centre	67	

8.2 Noise control and management

8.2.1 Noise assessment and implementation of noise mitigation

Changes relevant to the regulated activities since the 2016 permit application include a storage building attached to Unit 17 as well as changing to 3 shift pattern which includes nightwork from Monday up to

Friday. HGV traffic associated with deliveries, product and waste despatch still only occur during daytime operational hours.

The 2023 noise assessment looked at assessing the impact of the steam generating plant. Although the plant has been in operation an extended period, two noise complaints were received after the erection of the storage Unit (2023), indicating that the southeast facing wall of this Unit provided an additional reverberating surface for noise.

The noise assessment included operational noise measurements on site (as detailed above) as well as offsite ambient, residual and background noise level measurements at the nearest sensitive location on Enfield Road and at the southeast corner of the Hunt End Industrial Estate on Enfield Road.

The assessment concluded that there would be the potential for significant adverse impact at the sensitive receptor location and recommendations were made to reduce noise emissions.

The control measures implemented were the installation of adsorption cladding to the existing 4m high noise barrier and Unit 17 plus the installation of a new storage building façade. These measures were selected chosen to be achieve noise reduction at the sensitive receptor as soon as possible.

The effectiveness of these measures was assessed by the noise consultant through a repeat site visit taking repeat measurements and noting a 3dB reduction, in line with expectations for the remedial measures.

8.2.2 Procedural management

Nighttime yard activity and break out noise from open doors could also increase the potential impact on nearby residents. This is due to the intermittent nature of such noise making it distinct from the ambient nighttime noise level. The main control measure in place is ceasing all external yard activity after 11 pm. Activities do not recommence until 6:00 the following day.

Environmental noise is managed through the identification and control of ambient noise as environmental aspect requiring control and implementing control measures accordingly. The main control measures are:

- Planned preventative maintenance including daily checks of the operation of the steam generation plant as well as regular servicing by contractors;
- Inclusion of environmental noise, its sources and potential negative impact into operator induction and training packages;
- Refresher training including tool box talk; and
- Signage across the site reminding operators to “Keep noise to a minimum – please respect our neighbours” at areas of noisy yard activities or smoking areas.

9. Environmental risk assessment

9.1 Identification and location of sensitive receptors

In order to assess the impact of the facility on the surrounding environment, sensitive human and ecological receptors have been identified. Human receptors were identified using a local knowledge of the area and appropriate web-based searches including via https://magic.defra.gov.uk/. In particular, dwellings, schools and hospitals were searched for as well as public open spaces.

Sensitive ecological receptors were identified based on a Nature and Heritage Conservation Screening report for bespoke installations provided by the EA as part of the pre-application process in 2016. This was further supported by appropriate web-based searches including via https://magic.defra.gov.uk/ and the Redditch Borough Council local Plan No 4 (Policy 16 sites).

In identifying sensitive ecological receptors, a 2km radius around the site has been considered. For human receptors, a 1km radius has been considered. The details of receptors are given in Table 12 below.

Table 12: Sensitive receptors relevant to the site

Name of receptor	Nature of receptor	Emission which may impact on the receptor and their relevant pathways
Designated environmental receptors within 2km of the installation		
Rough Hill and Wirehill Woods – SSSI	Botanical broadleaved, mixed and yew woodland-lowland	Air – nitrogen deposition
Redditch Woods: Walkwood Coppice LNR – urban fringe	Botanical, newts ancient semi-natural woodland that was partly clear-felled about 50 years ago and has now regenerated BAP Species Great-crested Newt.	Air – nitrogen deposition
Redditch Woods Oakenshaw Woods LNR – urban fringe	Botanical large block of woodland in the centre of Redditch dominated by oak (both native species are present) with abundant birch and frequent ash.	Air – nitrogen deposition
UK Biodiversity Action Plan (BAP) - Priority Habitat Northern corner of New Coppice	Botanical Good quality semi-improved grassland	Air – nitrogen deposition
Ancient woodland New Coppice	Botanical Irreplaceable habitat - Ancient woodland	Air – nitrogen deposition
UK Biodiversity Action Plan (BAP) - Priority Habitat Deciduous woodland adjacent to site in southwest and Stonepits Copse	Botanical Broadleaved, mixed and yew woodland	Air – nitrogen deposition
UK Biodiversity Action Plan (BAP) - Priority Habitat Traditional orchard – off Tipping's Hill	Botanical broadleaved, mixed and yew woodland-	Air – nitrogen deposition
Human receptors within 1 km of the installation		
Dwellings 20m southeast, northeast and south beginning on Enfield Road	Human	Noise, odour, air
St Augustine's High School 250m east	Human	Noise, odour, air

Name of receptor	Nature of receptor	Emission which may impact on the receptor and their relevant pathways
Dwellings 120m west beginning on Hunt End Lane	Human	Noise, odour, air
Crabbs Cross Playing fields 450m northeast	Human	Noise, odour, air
Crabbs Cross Academy 700m northeast	Human	Noise, odour, air
Allotment Gardens of Walkwood Road 750 m northwest	Human	Noise, odour, air

9.2 Emissions screening and data

9.2.1 Introduction

The principal point source emissions to air and sewer from the installation are identified and characterised in Sections 7.1 and 7.3. This section presents an assessment of the impact of these emissions on these receiving environments.

As discussed, there is no monitoring data available for point source emissions to atmosphere and no emission limits are applied.

9.2.2 Emissions to air

The point source emission arising as a result of regulated activities at the site are small scale releases of products of combustion from vented steam/ water vapour form steam tunnel vents (A1 and A2) and steam generation plant and hot water boiler (A3 and A4).

Visible emissions A1 and A2

Impacts from steam/water vapour emissions from A1 and A2 are based on the as percentage of time the visible plume length extends beyond the site boundary. Emissions will occur from time to time when the temperature in the steam tunnel is too high and steam needs to be vented.

Emissions from A1 are not considered to extend beyond the site boundary due to the location of the stack and the nature of the emissions: short infrequent releases though a small vent.

As emissions from A2 are released through the side gable end of Unit 17 at the site boundary any visible plume from the stack has to be assumed to be extending beyond the site boundary. Guidance on assessing the significance of visible emissions suggests there to be a medium impact of emissions from emission point A2:

Medium Impact criteria:

- regular large impact from operation of process
- plume length exceeds boundary >5% of daylight hours per year
- sensitive local receptors

When assessing whether a medium impact is acceptable the guidance continues:

> *…Conditions that result in medium or lower impacts can be considered acceptable and no further control measures are considered to be required…*

We believe this would be a fair assessment of the situation at A2.

Products of natural gas combustion A3 and A4

Due to the small size of the combustion plant in operation on the site these emissions do not attract emission limits set under UK legislation and therefore an assessment is not expected to be required. Consequently, these emissions are not considered significant in terms of their potential to impact on local receptors and carbon dioxide emissions are already monitored through the company's participation in the AISE Charter for sustainable cleaning.

Fugitive emissions to air

Fugitive emissions to air are considered to have an insignificant impact on offsite human and environmental receptors. All fugitive emissions to air are generated inside Units 17, 21 and 23 and they are first and foremost controlled through the company's control of substances hazardous to human health. No health and safety issues have been identified and there are no additional control measures in place to protect workers from airborne substances posing a risk, apart from the LEV plant on the cream cleaner blending vessels. Following the particulate abatement filter on the LEV, residuals emissions are released into the building.

9.2.3 Emissions to Sewer

The approach to risk assessment for the emissions to sewer has remained the same as during the LII permit application in 2016. The relevant approach and data details have been confirmed with Severn Trent Water (STW) to ensure no change in their approach. The risk assessment of emissions to sewer has been updated and is set out below.

The guidance for risk assessment for risks from the specific activity on the gov.uk website was interpreted as following the guidance for surface water risk assessment for hazardous pollutants in connection with the latest version of the H1 Software tool (version 9.2).

This approach was chosen as the composition of the effluent was known in terms of the individual substances present in the products and the known dilution factor of cleaning, which allowed the effluent concentrations to be estimated. However, none of the substances present had published Environmental Quality Standards (EQS) and sewage treatment reduction factors, and it is understood that both are required in order to complete the screening using the software too provided by the EA.

After consultation with the EA in 2016 it was recommended the approach for sanitary discharges was used, i.e. regarding treated sanitary discharges from a WWTP to surface water. As the discharge from the site is not a direct discharge from the facility to surface water, the reduction of the pollutants achieved by the WWTP should be acknowledged by using the published sewage treatment reduction factors.

The pollutants and determinants assessed this way are:

- Sanitary – included BOD, Ammonia, suspended solids;
- Phosphorous;
- pH;
- Temperature; and
- Dissolved inorganic nitrogen – sum of nitrite, nitrate and ammonia as N.

There are no reduction figures for temperature, pH, COD and suspended solids which have emission limits set as part of the TEDC. There are reduction factors set for ammonia (ammonia: 92% and total nitrogen: 52%) and phosphorous (phosphorous containing compounds as PL 20%).

The approach for assessing the impact of sanitary and other pollutants for continuous discharges of trade or sewage effluent is as follows:

A. Identify the uses objectives and target standards for the receiving water body of your discharge;

B. Assess if the receiving water currently meets the reported and target standards;

C. Calculate allowable discharge limit:

D. Check statutory requirements on emission limits;

E. Check non-statutory requirements on emission limits; and

F. Confirm final discharge and control.

This is very different to the screening tests set out for hazardous pollutants and it would be difficult to undertake screening from the position of operator discharging to sewer compared to WWTP operator discharging to controlled waters.

It should also be noted that this is an existing discharge and the application for the permit will not alter the composition or volume of the trade effluent discharged.

The approach taken to assess the potential impact of the trade effluent in question on the final discharge to surface water was to consult STW to ascertain how the utility company has assessed the impact from a small volume trade effluent, such as this one on the final effluent quality, at the time of issuing a trade effluent consent. This is considered to cover point A to C above with the allowable discharge limits being represented by the consent limits.

The consultation with STW revealed that during the consent application determination stage an initial screening assessment is undertaken to establish the composition of the effluent and whether there is the likelihood of any substances which may affect the operation of the WWTP and subsequently the quality of the final discharge. In addition, the screening assessment examines the maximum flow, and the maximum organic load expected from the site making the application.

If the daily flow rate from the site is less than 1% of the inflow to the sewage treatment works under low flow conditions (dry flow) then STW concludes that the risks of the trade effluent discharge on the operation of WWTP and final effluent quality are screened out as insignificant. Consequently, a consultation with the Operations and Compliance departments, a more detailed impact assessment on the WWTP operation and the final effluent quality are not deemed to be required.

In 2016, STW stated the daily dry flow rate for the WWTP that receives the effluent from the site to be 3576 m^3. The daily maximum that would be discharged from site would be 3m^3 as this is the limit in the TEDC. Hence, Star Brands' contribution is 0.1% of the flow and hence well below the insignificance criteria of 1%. Figures for repeating the screening test for the organic load factor were not possible as this data was not available from STW.

The fact that the effluent has been screened out as insignificant by STW has been interpreted that it has an insignificant impact on final effluent quality and hence does not lead to or threaten any deterioration of the water quality of the receiving water body.

9.2.4 Odour

Odour emissions are not significant and are unlikely to be perceived beyond the site boundary at levels that would constitute pollution. Small volumes of odorous materials are decanted, weighed and added to the blending vessels. Fugitive emissions from this process would be intermittent throughout a shift. There is no active extraction, and odour would only reach the ambient air through openings in the building fabric. The above facts and the pleasant hedonistic tone of the odours is considered to support the conclusion on significance.

9.2.5 Noise

Operational environmental noise has been surveyed and assessed in 2023, reflecting the current operational set up at the site. The assessment did conclude that there would be a possibility of significant adverse impact at the nearest sensitive receptors. As mitigation measure Star Brands installed

adsorption cladding to the existing 4m high noise barrier as well as Unit 17 and a new storage building façade was installed. A repeat survey concluded that environmental noise levels were reduced to an acceptable level. This is supported through the fact that there have been no noise complaints since completion of the works.

Ongoing noise management is considered adequate to keep the noise impact from the regulated activities and directly associated activities to an acceptable level.

10. BAT Assessment

A BAT Assessment has been prepared for the changes proposed in this variation application and has been presented in BAT Table 13.

The following guidance documents are considered relevant to the preparation of the BAT assessment as agreed in advanced pre-application discussions with the EA:

- Technical guidance EPR4.02: Speciality organic chemicals Sector (2009) (expected to be the principal source of Best Available Technique (BAT) Criteria);
- Manufacture of fine organic chemicals (OFC) BAT Reference (BREF) Note (2006)
- Common wastewater and waste gas treatment/management systems in the chemical sector - BREF note (CWW) and BAT Conclusions (BATC) (2016)
- BREF document for common waste gas management and treatment systems in the chemical sector (WGC) (2023) and BATC (2022)

The BAT criteria set out in Section 5 of the OFC BREF Note have been incorporated into UK Technical Guidance EPR4.02: Speciality organic chemicals Sector. In addition, there are many sections that do not apply to this variation application for the following reasons:

- Existing site and no additional process, chemical reaction or chemical reactor/processing equipment installed,
- Simple, low risk chemical reaction and process undertaken eliminating a large amount of the issues addressed in the TG EPR4.02 and OFC BREF Note.

CWW and WGC have been reviewed and addressed if additional more up to date BAT criteria were applicable to the installation compared to the main BAT guidance documents that have as yet to go through the review process to produce updated BREF note documents and associated BATC.

Table 13: BAT Assessment

Indicative BAT		Compliance Indicator	Star Brands Limited arrangements
Technical Guidance EPR4.02 – speciality organic chemicals sector (2009)			
1 Managing your activities			
1.1 **Environmental performance indicators**	1. Monitor and benchmark your environmental performance, and review this at least once a year. Your plans for minimising environmental impacts should be incorporated into on-going Improvement programmes. Indicators can be derived using the Horizontal Guidance Note H1 Environmental Risk Assessment (see GTBR Annex 1). It is suggested that indicators are based on tonnes of organics produced (tOP) as they provide a good basis for measuring performance within an installation or a single company year on year.	**YES**	Please see Section 3 Table 1. - Checking performance and taking corrective action, paying particular attention to: (a) monitoring and measurement; - Application of sectoral benchmarking on a regular basis; and - Management review: this would also include a review of objectives and targets, KPIs recorded and reported for the AISE CSC initiative.
1.2 **Accident management**	In addition to the guidance in Getting the Basics Right, guidance prepared in support of the COMAH Regulations may help you in considering ways to reduce the risks and consequences of accidents, whether or not they are covered by the COMAH regime.	**YES**	Accident and emergency preparedness is covered through the EMS system as described in Section 3. The business continuity plan is the company's emergency response and business recovery plan, covering all identified emergency and accident scenarios. The company has prepared a climate change risk assessment including outline adaptation responses where a potential impact has been identified.
1.3 **Energy efficiency**	You should where appropriate: Assess the environmental impact of each process and choose the one with the lowest environmental impact. (We recognise that your choice may be constrained, for example, by the integration of processes on a complex site).	**YES**	The site is an existing operation with no changes to the principal design and operation of the regulated process since the standard rules permit was issued. Energy efficiency and carbon emissions reduction are driven and informed by KPIs, which are monitored and reported against annually. To achieve continued improvement a programme of energy efficiency improvement projects is being implemented, as described in Section 6.
1.4 **Efficient use of raw materials and water**	As a general principle, you need to demonstrate the measures you take to: • reduce your use of all raw materials and intermediates; • substitute less harmful materials, or those which can be more readily abated and when abated lead to substances that are more readily dealt with • understand the fate of by-products and contaminants and their environmental impact.	**YES**	As set out in Section 5, the company has a comprehensive raw material management system. Reduction of raw material use is driven by optimising the blending and clean down process, maximizing product yield per batch and reducing waste volumes and contained raw material concentrations.

Indicative BAT		Compliance Indicator	Star Brands Limited arrangements
	You should where appropriate: 1. Maximise heat transfer between process streams where water is needed for cooling. Use a recirculating system with indirect heat exchangers and a cooling tower in preference to a once-through cooling system. 2. Where water is used in direct contact with process materials, recirculate the water after stripping out the absorbed substances.		One of the key objectives of the New Product Development (NPD) and Technical Department is to develop concentrates, reducing water consumption and increasing transport efficiency. In turn this is intended to reduce the overall environmental impact of the products. The raw materials policy (SOP423) is key to managing hazardous properties of raw materials, as set out in more detail in Section 5.1. Operational practices concern secondary grade product rework and waste management, as described in Sections 4 and 5.3.
1.5 **Avoidance, recovery and disposal of waste**	You should where appropriate: 1. Demonstrate that the chosen routes for recovery or disposal represent the best environmental option. Consider avenues for recycling back into the process or reworking for another process wherever possible. 2. Provide a detailed assessment identifying the best environmental options for waste disposal where you cannot avoid disposing of waste.	**YES**	The company manages waste in accordance with the waste hierarchy, as described in Section 5.3. Wherever possible, second grade product is reworked into new batches of liquid product. Clean down procedures are optimized to use wash water for the next product batch or collect washings into IBCs for recovery off site.

Indicative BAT		Compliance Indicator	Star Brands Limited arrangements
2 Operations			
2.1 **Design of a new process**	N/A	**N/A**	The site is an existing operation with no changes to the principal of the regulated process undertaken since the standard rules permit was issued.
2.2 **Storage and handling of raw materials products and waste**	You should where appropriate: 1. Store reactive chemicals in such a way that they remain stable, such as under a steady gas stream, for example. If chemical additions are necessary, then tests should be carried out to ensure the required chemical composition is maintained. Inhibitors may also be added to prevent reactions. 2. Vent storage tanks to a safe location. 3. Use measures to reduce the risk of contamination from large storage tanks. In addition to sealed bunds, use double-walled tanks and leak detection channels. 4. Use HAZOP studies to identify risks to the environment for all operations involving the storage and handling of chemicals and wastes. Where the risks are identified as significant, plans and timetables for improvements should be in place.	**YES**	Chemical delivery handling and storage is described in detail in Section 4.
2.3 **Plant systems and equipment**	You should where appropriate: 1. Formally consider potential emissions from plant systems and equipment and have plans and timetables for improvements, where the potential for substance or noise pollution from plant systems and equipment has been identified. 2. Carry out systematic HAZOP studies on all plant systems and equipment to identify and quantify risks to the environment. 3. Choose vacuum systems that are designed for the load and keep them well maintained. Install sufficient instrumentation to detect reduced performance and to warn that remedial action should be taken. ***Overpressure protection systems*** 1 Carry out a systematic HAZOP study for all relief systems, to identify and quantify significant risks to the environment from the technique chosen. 2. Identify procedures to protect against overpressure of equipment. This requires the identification of all conceivable over-pressure situations, calculation of relief rates, selection of relief method, design of the vent system, discharge and disposal considerations, and dispersion calculations. In some cases careful	**YES**	Manufacturing process control and identification, characterisation and control of point and fugitive emissions to air, sewer and controlled water under normal operating and OTNOC conditions are described in detail in Sections 4 and 7. **Overpressure protection systems** Over pressurisation is not considered a potential risk from the neutralization reactions that occur at the installation.

Indicative BAT		Compliance Indicator	Star Brands Limited arrangements
	design can provide intrinsic protection against all conceivable over-pressure scenarios, so relief systems and their consequential emissions can be avoided. 3. Maintain in a state of readiness all equipment installed in the venting system even though the system is rarely used. ***Heat exchangers and cooling systems*** You should where appropriate: 1. Consider leak detection, corrosion monitoring and materials of construction, preferably in a formal HAZOP study. Plans and timetables for improved procedures or replacement by higher integrity designs should be in place where the risks are identified as significant. 2. If corrosion is likely, ensure methods for rapid detection of leaks are in place and a regime of corrosion monitoring in operation at critical points. Alternatively, use materials of construction that are inert to the process and heating/cooling fluids under the conditions of operation. 3. For cooling water systems, use techniques that compare favourably with relevant techniques described in the Industrial Cooling Systems BREF. ***Purging Facilities*** You should where appropriate: 1. Assess the potential for the release to air of VOCs and other pollutants along with discharged purge gas and use abatement where necessary.		**Heat exchangers and cooling systems** Process vessels cooling is not required. Process vessel heating is not required. **Purging facilities** Purging the process vessels, transfer lines and filling or packaging lines is not required.

Indicative BAT		Compliance Indicator	Star Brands Limited arrangements
2.4 **Reaction stage**	**General** You should where appropriate: 1. With a clear understanding of the physical chemistry, evaluate options for suitable reactor types using chemical engineering principles. 2. Select the reactor system from a number of potentially suitable reactor designs - conventional STR, process-intensive or novel-technology - by formal comparison of costs and business risks against the assessment of raw material efficiencies and environmental impacts for each of the options. 3. Undertake studies to review reactor design options based on process-optimisation where the activity is an existing activity and achieved raw material efficiencies and waste generation suggest there is significant potential for improvement, The studies should formally compare the costs and business risks, and raw material efficiencies and environmental impacts of the alternative systems with those of the existing system. The scope and depth of the studies should be in proportion to the potential for environmental improvement over the existing reaction system. 4. Maximise process yields from the selected reactor design, and minimise losses and emissions, by the formalised use of optimised process control and management procedures (both manual and computerised where appropriate). 5. Minimise the potential for the release of vapours to air from pressure relief systems and the potential for emissions of organic solvents into air or water, by formal consideration at the design stage - or formal review of the existing arrangements if that stage has passed. **Minimal liquid losses from reaction systems** should where appropriate: 1. Use the following features that contribute to a reduction in waste arisings from clean-outs: • low-inventory continuous throughput reactors with minimum surface area for cleaning; • minimum internals such as baffles and coils in the reactor; • smooth reactor walls, no crevices; • flush bottom outlet on reaction vessels; • all associated piping to slope back to the reactor or to a drain point; • sufficient headroom under the reactor for collection of all concentrated drainings in drums or other suitable vessel, if necessary;	**YES**	Please see Section 4 for detail The only chemical reaction taking place in the regulated process is neutralization. None of the reactions require temperature, pressure or emissions control. Any changes in formulation or ingredients would be fully evaluated during new product development on a laboratory scale. Any new or replacement blending vessels and ancillary equipment are selected taking the following into account: • Space constraints in the available blending platform; • Achieving adequate batch sizes; • Sufficient mixing depth, speed and control; • Ease of safe addition of raw material ingredients; • Suitable vessel outlets to maximise product transfer by gravity; • Reducing product losses by maximizing the product removal prior to clean down; and • Ease of cleaning, reducing cleaning water consumption and waste generation.

Indicative BAT		Compliance Indicator	Star Brands Limited arrangements
	• minimal pipework, designed to eliminate hold-up and to assist drainage; • pipework designed to allow air or nitrogen blowing; • system kept warm during emptying to facilitate draining; • HAZOP studies used to assess the potential for the choking of lines by high-melting point material; • campaigns sequenced so that cleaning between batches is minimised; • campaigns made as long as possible to reduce the number of product change-overs; • where a complete clean is necessary, use cleaning methods that minimise the use of cleaning agents, (e.g. steam-cleaning, rotating spray jets or high-pressure cleaning) or use a solvent which can be re-used; • carry out HAZOP studies to minimise the generation of wastes and to examine their treatment/disposal; • consider use of disposable plastic pipe-liners; • eliminate or minimise locations for solids to settle-out; • consider duplicate or dedicated equipment where it can reduce the need for cleaning that is difficult. **Minimisation of vapour losses** You should where appropriate: 1. Review your operating practices and review vent flows to see if improvements need to be made. 2. Consider opportunities to enhance the performance of abatement systems.		

Indicative BAT		Compliance Indicator	Star Brands Limited arrangements
2.5 **Separation stage**	**Liquid vapour separations** 1 Choose your separation technique following a detailed process design and HAZOP study. Follow formal operating instructions to ensure effective separation and minimisation of losses. Adhere to design conditions such as heat input, reflux flows and ratios, etc. 2. Install instrumentation to warn of faults in the system, such as a temperature, pressure or low coolant-flow alarms. **Liquid - liquid separations** 1 Use techniques which maximise physical separation of the phases (and also aim to minimise mutual solubility) where practicable. 2. When the phases are separated, use techniques which prevent (or minimise the probability and size of) breakthrough of the organics phase into a waste-water stream. This is particularly important where the environmental consequences of subsequent releases of organics to air or into controlled waters may be significant (e.g. where the effluent is treated in a DAF unit or some of the organic components are resistant to biological treatment). 3. When a separation is done by hand, use a "dead man's handle", backed up by good management, to improve the chance of the flow being properly controlled as the phase boundary approaches. 4. Consider if automatic detection of the interface is practicable. 5. Where you are discharging to drain, consider whether there should be an intermediate holding or "guard" tank to protect against accidental losses from the organics phase **Solid liquid separations** 1. Use techniques to minimise, re-use and/or recycle rinse water, and to prevent breakthrough of solids. 2. Install instrumentation or other means of detecting malfunction as all of the techniques are vulnerable to solids breakthrough. 3. Consider installing "guard" filters of smaller capacity downstream which, in the event of breakthrough, rapidly 'clog' and prevent further losses. 4. Have good management procedures to minimise loss of solids, escape of volatiles to air and excessive production of wastewater.	**N/A**	Not applicable to the process

Indicative BAT		Compliance Indicator	Star Brands Limited arrangements
2.6 **Purification stage**	Waste associated with the purification stage may arise from: • impurities in the raw materials - so a change in the raw material specifications may reduce waste arisings • by-products generated by the process - so a change in reaction conditions, catalyst, solvent, etc. may improve the selectivity of the reaction and reduce or eliminate by product formation. Waste minimisation principles apply through - Choosing different raw materials to reduce the type and volume of impurities - Minimise or de- hazard by products generated	**N/A**	Not applicable to the process
2.7 **Chemical process control**	You should where appropriate: 1. Monitor the relevant process controls and set with alarms to ensure they do not go out of the required range.	**YES**	Please see Section 4 for details of process control.
2.8 **Analysis**	Analyse the components and concentrations of by products and waste streams to ensure correct decisions are made regarding onward treatment or disposal. Keep detailed records of decisions based on this analysis in accordance with management systems.	**YES**	Please see Section 5.3 for details.

Indicative BAT		Compliance Indicator	Star Brands Limited arrangements
3 Emissions and monitoring			
3.1 **Point source emissions**	**General** 1 Formally consider the information and recommendations in the BREF on Common Wastewater and Waste Gas Treatment/ Management Systems in the Chemical Sector (see Reference 1) as part of the assessment of BAT for point-source releases to air, in addition to the information in this note. 2. Identify the main chemical constituents of the emissions, including VOC speciation where practicable. 3. Assess vent and chimney heights for dispersion capability and assess the fate of the substances emitted to the environment. 4. Use the following measures to minimise emissions to air: • recover emissions rich in organics by fractionation and then recycle • recover and reuse solvents • continuously monitor off-gas concentration from reaction vessels, dryers, condensers, evaporators and scrubbers where off-gases are shown to be environmentally significant **Control of VOC emissions** Abatement of volatile organic compounds (VOCs) is described in the Abatement Guidance Note A3 (see Reference 3, Annex 2) and that note should be consulted where VOC emissions are significant. **Point source emissions to water** 1 Control all emissions to avoid a breach of water quality standards as a minimum. Where another technique can deliver better results at reasonable cost it will be considered BAT and should be used. 2. Use the following measures to minimise water use and emissions to water: • where water is needed for cooling, minimize its use by maximising heat transfer between process streams • use water in recirculating systems with indirect heat exchangers and a cooling tower rather than a once through system. (A water make-up treatment plant and a concentrated purge stream from the system to avoid the build-up of contaminants are likely to be necessary.) • leaks of process fluids into cooling water in heat exchangers are a frequent source of contamination. Monitoring of the cooling water at	**YES**	Please see Sections 4, 7 and 9 for details of general and VOC emissions control requirements. **Point source emissions to water** There are no process emissions to controlled waters. Emissions to sewer are monitored and released under Trade effluent discharge consents to sewer as described in Section 7. The environmental risk assessment undertaken for these emissions to sewer concluded emissions posed an insignificant potential environmental impact on STW's WWTP. This was established through a risk assessment process based on the process undertaken by the STW WWTP to assess suitability of acceptance of waste stream into WWTP and impact on final effluent discharge quality.

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	relevant points should be appropriate to the nature of the process fluids. In a recirculatory cooling system, leaks can be identified before significant emission to the environment has occurred. The potential for environmental impact is likely to be greater from a once through system. Planned maintenance can help to avoid such occurrences • water used for cleaning can be reduced by a number of techniques, e.g. by spray cleaning rather than whole vessel filling • strip process liquor and treat, if necessary, then recycle/reuse • use wet air oxidation for low volumes of aqueous effluent with high levels of organic content, such as waste streams from condensers and scrubbers • neutralise waste streams containing acids or alkalis to achieve the required pH for the receiving water • strip chlorinated hydrocarbons in waste streams with air or steam and recycle by returning to process where possible • recover co-products for re-use or sale • periodically regenerate ion exchange columns • pass wastewater containing solids through settling tanks, prior to disposal • treat waste waters containing chlorinated hydrocarbons separately where possible to ensure proper control and treatment of the chlorinated compounds. Contain released volatile chlorinated hydrocarbons and vent to suitably designed incineration equipment • non-biodegradable organic material can be treated by thermal incineration. However, the thermal destruction of mixed liquids can be highly inefficient, and the waste should be dewatered prior to incineration. **Point source emissions to land – landfilled waste** 1. Use the following measures to minimise emissions to land: • use settling ponds to separate out sludge (Note: Sludge can be disposed of to incinerator, encapsulation, land or lagoon depending upon its make up.) • chlorinated residues should be incinerated and not released to land. (Chlorinated hydrocarbons are not to be released to the environment due to their high global warming and ozone depletion potentials.) • either recycle off spec product into the process or blend to make lower grade products where possible • many catalysts are based on precious metals and these should be recovered, usually by return to the supplier.		**Point source emissions to land - landfilled waste** Emissions to land – please see Section 5.3 for detail

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3.2 **Fugitive emissions**	1. Identify all potential sources and develop and maintain procedures for monitoring and eliminating or minimising leaks and releases of VOCs from all non-process stream sources. 2. Choose vent systems to minimise breathing emissions (for example pressure/ vacuum valves) and, where relevant, should be fitted with knock-out pots and appropriate abatement equipment. 3. Use the following techniques (together or in any combination) to reduce losses from storage tanks at atmospheric pressure: • maintenance of bulk storage temperatures as low as practicable, taking into account changes due to solar heating etc. • tank paint with low solar absorbency • temperature control • tank insulation • inventory management • floating roof tanks • bladder roof tanks • pressure/vacuum valves, where tanks are designed to withstand pressure fluctuations • specific release treatment (such as adsorption condensation). **Fugitive emissions to surface water, sewer and groundwater** 1. Provide hard surfacing in areas where accidental spillage or leakage may occur, e.g. beneath prime movers, pumps, in storage areas, and in handling, loading and unloading areas. The surfacing should be impermeable to process liquors. 2. Drain hard surfacing of areas subject to potential contamination so that potentially contaminated surface run-off does not discharge to ground. 3. Hold stocks of suitable absorbents at appropriate locations for use in mopping up minor leaks and spills and dispose to leak-proof containers. 4. Take particular care in areas of inherent sensitivity to groundwater pollution. Poorly maintained drainage systems are known to be the main cause of groundwater contamination and surface/above-ground drains are preferred to facilitate leak detection (and to reduce explosion risks). 5. Additional measures could be justified in locations of particular environmental sensitivity. Decisions on the measures to be taken should take account of the risk to groundwater, taking into consideration the factors outlined in the Agency	**YES**	Please see Sections 4 and 7 for details of the identification, characterisation and control of fugitive emissions to air, sewer and controlled waters.

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	document, Policy and Practice for the Protection of Groundwater, including groundwater vulnerability and the presence of groundwater protection zones. 6. Surveys of plant that may continue to contribute to leakage should also be considered, as part of an overall environmental management system. In particular, you should consider undertaking leakage tests and/or integrity surveys to confirm the containment of underground drains and tanks.		
3.3 **Odour**	1. Manage the operations to prevent release of odour at all times. 2. Where odour releases are expected to be acknowledged in the permit, (i.e. contained and treated prior to discharge or discharged for atmospheric dispersion): • for existing installations, the releases should be modelled to demonstrate the odour impact at sensitive receptors. The target should be to minimise the frequency of exposure to ground level concentrations that are likely to cause annoyance. • for new installations, or for significant changes, the releases should be modelled, and it is expected that you will achieve the highest level of protection that is achievable with BAT from the outset. • where there is no history of odour problems then modelling may not be required although it should be remembered that there can still be an underlying level of annoyance without complaints being made. • where, despite all reasonable steps in the design of the plant, extreme weather or other incidents are liable, in our view, to increase the odour impact at receptors, you should take appropriate and timely action, as agreed with us, to prevent further annoyance (these agreed actions will be defined either in the permit or in an odour management statement). 3. Where odour generating activities take place in the open, or potentially odorous materials are stored outside, a high level of management control and use of best practice will be expected. 4. Where an installation releases odours but has a low environmental impact by virtue of its remoteness from sensitive receptors, it is expected that you will work towards achieving the standards described in this guidance note, but the timescales allowed to achieve this might be adjusted according to the perceived risk. 5. Where further guidance is needed to meet local needs, refer to Horizontal Guidance Note H4 Odour (see GTBR).	**YES**	Please See Section 7.5 for odour sources, their characterisation and control.

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3.4 **Noise and vibration**	1. Install particularly noisy machines such as compactors and pelletisers in a noise control booth or encapsulate the noise source. 2. Where possible without compromising safety, fit suitable silencers on safety valves. 3. Minimise the blow-off from boilers and air compressors, for example during start up, and provide silencers.	**YES**	Please see Section 8 for noise and vibration sources, their characterisation and control.
3.5 **Monitoring**	1. Carry out an analysis covering a broad spectrum of substances to establish that all relevant substances have been taken into account when setting the release limits. The need to repeat such a test will depend upon the potential variability in the process and, for example, the potential for contamination of raw materials. Where there is such potential, tests may be appropriate. 2. Monitor more regularly any substances found to be of concern, or any other individual substances to which the local environment may be susceptible and upon which the operations may impact. This would particularly apply to the common pesticides and heavy metals. Using composite samples is the technique most likely to be appropriate where the concentration does not vary excessively. 3. If there are releases of substances that are more difficult to measure and whose capacity for harm is uncertain, particularly when combined with other substances, then "whole effluent toxicity" monitoring techniques can be appropriate to provide direct measurements of harm, for example, direct toxicity assessment. **Monitoring and reporting of waste emissions** 1. Monitor and record: - the physical and chemical composition of the waste - its hazard characteristics - handling precautions and substances with which it cannot be mixed **Environmental monitoring beyond installation boundary** 1 Consider the following in drawing up proposals: - determinands to be monitored, standard reference methods, sampling protocols	**YES**	Please see Section 7.6 concerning the monitoring of emissions to air and sewer. The physical and chemical composition, hazardous properties as well as storage and handling requirements of waste streams are all managed through the waste management standard (SB STD016) as described in Section 5.3. Noise surveys are undertaken at sensitive receptors or background locations as and when required (e.g., assessment of impact of new or changed plant affecting external ambient noise levels or as a result of a substantiated noise complaint). Noise survey processes are described in more detail in Section 8.

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	- monitoring strategy, selection of monitoring points, optimisation of monitoring approach - determination of background levels contributed by other sources - uncertainty for the employed methodologies and the resultant overall uncertainty of measurement - quality assurance (QA) and quality control (QC) protocols, equipment calibration and maintenance, sample storage and chain of custody/audit trail - reporting procedures, data storage, interpretation and review of results, reporting format for the provision of information.		

Indicative BAT		Compliance Indicator	Star Brands Limited arrangements
CWW - Waste water and waste gas treatment in chemical sector			
BATC 1	In order to improve the overall environmental performance, BAT is to implement and adhere to an environ mental management system (EMS) that incorporates all of the following features: (i) commitment of the management, including senior management; (ii) an environmental policy that includes the continuous improvement of the installation by the management; 9.6.2016 L 152/28 EN Official Journal of the European Union (iii) planning and establishing the necessary procedures, objectives and targets, in conjunction with financial planning and investment; (iv) implementation of procedures paying particular attention to: (a) structure and responsibility; (b) recruitment, training, awareness and competence; (c) communication; (d) employee involvement; (e) documentation; (f) effective process control; (g) maintenance programmes; (h) emergency preparedness and response; (i) safeguarding compliance with environmental legislation; (v) checking performance and taking corrective action, paying particular attention to: (a) monitoring and measurement (see also the Reference Report on Monitoring of emissions to Air and Water from IED installations — ROM); (b) corrective and preventive action; (c) maintenance of records; (d) independent (where practicable) internal or external auditing in order to determine whether or not the EMS conforms to planned arrangements and has been properly implemented and maintained; (vi) review of the EMS and its continuing suitability, adequacy and effectiveness by senior management; (vii) following the development of cleaner technologies; (viii) consideration for the environmental impacts from the eventual decommissioning of the plant at the design stage of a new plant, and throughout its operating life; (ix) application of sectoral benchmarking on a regular basis; (x) waste management plan (see BAT 13).	**YES**	See Section 3 for further detail.

Indicative BAT		Compliance Indicator	Star Brands Limited arrangements
	Specifically for chemical sector activities, BAT is to incorporate the following features in the EMS: (xi) on multi-operator installations/sites, establishment of a convention that sets out the roles, responsibilities and coordination of operating procedures of each plant operator in order to enhance the cooperation between the various operators; (xii) establishment of inventories of wastewater and waste gas streams (see BAT 2). In some cases, the following features are part of the EMS: (xiii) odour management plan (see BAT 20); (xiv) noise management plan (see BAT 22).		
BATC 2	In order to facilitate the reduction of emissions to water and air and the reduction of water usage, BAT is to establish and to maintain an inventory of wastewater and waste gas streams, as part of the environmental management system (see BAT 1), that incorporates all of the following features: (i) information about the chemical production processes, including: (a) chemical reaction equations, also showing side products; (b) simplified process flow sheets that show the origin of the emissions; (c) descriptions of process-integrated techniques and waste water/waste gas treatment at source including their performances; (ii) information, as comprehensive as is reasonably possible, about the characteristics of the waste water streams, such as: (a) average values and variability of flow, pH, temperature, and conductivity; (b) average concentration and load values of relevant pollutants/parameters and their variability (e.g. COD/TOC, nitrogen species, phosphorus, metals, salts, specific organic compounds); (c) data on bioeliminability (e.g. BOD, BOD/COD ratio, Zahn-Wellens test, biological inhibition potential (e.g. nitrification)); (iii) information, as comprehensive as is reasonably possible, about the characteristics of the waste gas streams, such as: (a) average values and variability of flow and temperature; X, SO, chlorine, hydrogen chloride); (b) average concentration and load values of relevant pollutants/parameters and their variability (e.g. VOC, CO, NO X (c) flammability, lower and higher explosive limits, reactivity;	**YES**	Please see Sections 4 and 7 for further detail.

Indicative BAT		Compliance Indicator	Star Brands Limited arrangements
	(d) presence of other substances that may affect the waste gas treatment system or plant safety (e.g. oxygen, nitrogen, water vapour, dust).		
BATC 5	BAT is to periodically monitor diffuse VOC emissions to air from relevant sources by using an appropriate combination of the techniques I-III or, where large amounts of VOC are handled, all of the techniques I-III. I. sniffing methods (e.g. with portable instruments according to EN15446) associated with correlation curves for key equipment; II. optical gas imaging methods; III. calculation of emissions based on emissions factors, periodically validated (e.g. once every two years) by measurements. Where large amounts of VOCs are handled, the screening and quantification of emissions from the installation by periodic campaigns with optical absorption-based techniques, such as Differential absorption light detection and ranging (DIAL) or Solar occultation flux (SOF), is a useful complementary technique to the techniques I to III.	**N/A**	See Section 7.
BATC 6	BAT is to periodically monitor odour emissions from relevant sources in accordance with EN standards. Description Emissions can be monitored by dynamic olfactometry according to EN 13725. Emission monitoring may be complemented by measurement/estimation of odour exposure or estimation of odour impact. The applicability is restricted to cases where odour nuisance can be expected or has been substantiated.	**N/A**	See Section 7,
BATC 7	In order to reduce the usage of water and the generation of wastewater, BAT is to reduce the volume and/or pollutant load of wastewater streams, to enhance the reuse of wastewater within the production process and to recover and reuse raw materials.	**YES**	Please see Section 5.2.2.

Indicative BAT		Compliance Indicator	Star Brands Limited arrangements
BATC 8	In order to prevent the contamination of uncontaminated water and to reduce emissions to water, BAT is to segregate uncontaminated wastewater streams from wastewater streams that require treatment. The segregation of uncontaminated rainwater may not be applicable in the case of existing wastewater collection systems.	**YES**	Please see Sections 5.2.2, 5.3 and Section 7.3 and 7.4.
BATC 9	In order to prevent uncontrolled emissions to water, BAT is to provide an appropriate buffer storage capacity for waste water incurred during other than normal operating conditions based on a risk assessment (taking into account e.g. the nature of the pollutant, the effects on further treatment, and the receiving environment), and to take appropriate further measures (e.g. control, treat, reuse). The interim storage of contaminated rainwater requires segregation, which may not be applicable in the case of existing wastewater collection systems.	**YES**	See Sections 7.3.1 and 7.4.3. Due to the operational techniques used at the site to deal with liquid waste at the site, (i.e. transfer into IBCs and daily removal off site) there are always spare empty IBCs and pumps available to deal with smaller spills. The emergency response procedure would be implemented for larger spills, which are considered to be only associated with bulk delivery spills. Buffer capacity would be provided by the clamp down drain covers until the tanker contractor listed as a emergency response contact in the Business continuity plan arrives to remove material for offsite treatment and recovery or disposal.
BATC10	In order to reduce emissions to water, BAT is to use an integrated wastewater management and treatment strategy that includes an appropriate combination of the techniques in the priority order given below. a) Process integrated techniques - to prevent or reduce the generation of water pollutants b) Recovery of pollutants at source – recover pollutants prior to their discharge to the wastewater collection system c) Waste water pre-treatment – techniques to abate pollutants before the final wastewater treatment d) Final wastewater treatment – for example by preliminary and primary treatment, biological treatment, nitrogen removal, phosphorous removal and / or final solids removal techniques before discharge to receiving water body	**YES**	See Sections 5 and 7.
BATC 11	In order to reduce emissions to water, BAT is to pretreat wastewater that contains pollutants that cannot be dealt with adequately during final wastewater treatment by using appropriate techniques.	**YES**	See Section 7.3 and 9.2.3.

Indicative BAT		Compliance Indicator	Star Brands Limited arrangements
	Wastewater pretreatment is carried out as part of an integrated wastewater management and treatment strategy (see BAT 10) and is generally necessary to: -protect the final wastewater treatment plant (e.g. protection of a biological treatment plant against inhibitory or toxic compounds); - remove compounds that are insufficiently abated during final treatment (e.g. toxic compounds, poorly/non- biodegradable organic compounds, organic compounds that are present in high concentrations, or metals during biological treatment); - remove compounds that are otherwise stripped to air from the collection system or during final treatment (e.g. volatile halogenated organic compounds, benzene); - remove compounds that have other negative effects (e.g. corrosion of equipment; unwanted reaction with other substances; contamination of wastewater sludge). In general, pretreatment is carried out as close as possible to the source in order to avoid dilution, in particular for metals. Sometimes, wastewater streams with appropriate characteristics can be segregated and collected in order to undergo a dedicated combined pretreatment.		

Indicative BAT		Compliance Indicator	Star Brands Limited arrangements
WGC -Waste gas management and treatment systems (Applies to steam generating plant emissions and sleever tunnel emission only)			
BATC 2	Covered by BATC 2 of CWW	**YES**	See BATC 2 of CWW.
BATC 3	In order to reduce the frequency of the occurrence of OTNOC and to reduce emissions to air during OTNOC, BAT is to set up and implement a risk-based OTNOC management plan as part of the environmental management system (see BAT 1) that includes all of the following features: i) identification of potential OTNOC (e.g. failure of equipment critical to the control of channelled emissions to air, or equipment critical to the prevention of accidents or incidents that could lead to emissions to air ('critical equipment')), of their root causes and of their potential consequences; ii) appropriate design of critical equipment (e.g. equipment modularity and compartmentalisation, backup systems, techniques to obviate the need to bypass waste gas treatment during start-up and shutdown, high-integrity equipment, etc.); iii) set-up and implementation of a preventive maintenance plan for critical equipment (see BAT 1 xii); iv) monitoring (i.e. estimating or, where this is possible, measuring) and recording of emissions and associated circumstances during OTNOC; v) periodic assessment of the emissions occurring during OTNOC (e.g. frequency of events, duration, amount of pollutants emitted as recorded in point vi) and implementation of corrective actions if necessary; vii) regular review and update of the list of identified OTNOC under point i) following the periodic assessment of point v); vii) regular testing of backup systems.	**N/A**	As set out in Sections 7.1 and 7.2 OTNOC emissions from the steam generating plant, the hot water boiler and the steam vents of the sleever tunnels are considered to be non-significant due to their nature and likely frequency and duration. A specific OTNOC management plan is not considered to be required and operational process control as well as inspection and maintenance arrangements as described in the main body of the report are sufficient to reduce the impact of any OTNOC emissions to air.

Appendices

A. Advanced Pre-application Discussion Feedback

B. Plan Drawings

a. Site plan

b. Site Layout and Installation Boundary

c. Emission points location plan

d. Schematic Site Drainage Plan

e. Raw material storage and processing areas

C. Updated Site Condition Report

D. Process Flow Sheet – Blending

E. Maintenance template PPM checklists

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