Permitting decisions

Bespoke permit

We have decided to grant the permit for Woodland Mill operated by Wooltex UK Limited.

The permit number is EPR/VP3137QZ.

We consider in reaching that decision we have taken into account all relevant considerations and legal requirements and that the permit will ensure that the appropriate level of environmental protection is provided.

Purpose of this document

This decision document provides a record of the decision making process. It summarises the decision making process in the decision checklist to show how all relevant factors have been taken in to account.

This decision document provides a record of the decision making process. It:

- highlights key issues in the determination
- summarises the decision making process in the decision checklist to show how all relevant factors have been taken into account
- shows how we have considered the consultation responses.

Unless the decision document specifies otherwise we have accepted the applicant's proposals.

Read the permitting decisions in conjunction with the environmental permit. The introductory note summarises what the permit covers.

Description of the Installation

Woodland Mill ("the Installation") has been operational since 1996 as a weaving and dry processing facility and has not historically been regulated as an installation under the Environmental Permitting Regulations (EPR). The mill has until now been regulated by the local authority, Kirklees Council.

The addition of a new wet processing area in 2017, involving activities that have the potential to exceed the relevant thresholds within EPR, means that the facility is being regulated as Part A1 installation for the first time. The relevant activities under EPR relate to the 'wet' textile production process and the subsequent treatment and disposal of effluent to sewer, as follows:

- Section 6.4 Part A(1)(a), Pre-treating (by operations such as washing, bleaching or mercerization) or dyeing fibres or textiles in plant with a treatment capacity of more than 10 tonnes per day

- Section 5.4 Part A(1)(a)(ii), Disposal of non-hazardous waste with a capacity exceeding 50 tonnes per day involving physico-chemical treatment.

We refer to the above activities as *'listed'* activities.

An installation may also comprise "directly associated activities" (DAAs) which at this Installation includes several activities associated with the listed activities, e.g. raw materials handling and storage, and various textile finishing processes. Together, the listed activities and DAAs comprise the Installation.

Wet processing summary

The installation is designed for the weaving of upholstery fabrics, along with processing fibre, yarn and fabric by scouring, dyeing and finishing, and dyeing and winding of wool and synthetic fibre yarns, for the apparel, hand knitting, upholstery and carpet yarn manufacturing sectors of the textile trade. The fibrous raw materials for the process come in 3 forms of ecru, which is raw and unbleached, as follows:

- Top – this is wool which has typically been (a) scoured, involving the removal of contaminants such as dirt and grease, (b) carded, involving disentanglement, further cleaning and alignment of fibres, and (c) combed, in preparation for spinning, earlier in the supply chain prior to delivery to the installation.

  Normally further scouring will be carried out at the mill as part of the production process because it's unlikely that all traces of contamination will have been removed during initial scouring of the wool.

- Yarn - long continuous length of interlocked fibres spun from raw wool

- Woven fabric

Each type of raw material follows its respective production route as shown in Figure 1.

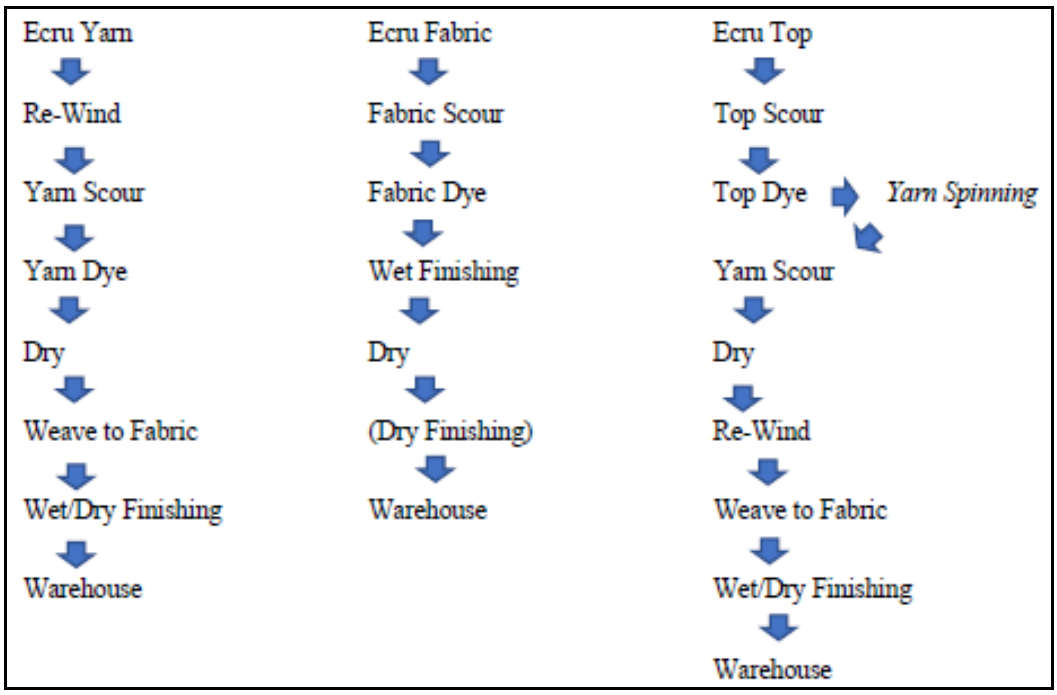

Figure 1 - Processing routes by raw material type carried out at the installation

Each production route involves the new wet processing area, where the common steps are:

1. Loading of material into pressurised dyeing machines, Thies Eco-Bloc HV machines, which run at high temperatures to speed up dyeing and ensure maximum uptake of dyestuff and any other chemical required on the textile being processed. The machines can be readily adapted to dye either loose fibre, yarn or fabric depending upon requirements.
2. Scouring (pre-wash solution) liquor pumped through the textile in the dyeing machine for a predetermined treatment time before being drained. Liquor is passed to the effluent drain or used in next process step.
3. Dyestuffs, technical grade chemicals and auxiliary chemicals, which are mixed to the required shade, are then pumped through the textile in the machine to achieve the colour required.
4. Rinsing step, in which the spent dyeing liquor is discharged and a clean lower temperature rinse water is circulated through the textile to wash off any un-absorbed dyestuff and chemicals.

Following removal from the dyeing machines some after treatments (wet finishing) may take place, but generally the textile is tensioned and dried in a stenter by the passage of warm air through the machine. The stenter can also be used to apply surface finishes to fabrics, e.g. flame resistance or soiling resistance, by applying treatment chemicals to the fabric surface before the fabric is dried. There are also a number of other fabric finishing machines at the installation which may be used, as follows:

- Decofast machine uses temperature, steam and pressure to modify the physical characteristics of the fabric such as surface feel, fabric thickness and suppleness.
- Cropping machine cuts fibre from the surface of the fabric to create different fabric surface textures.
- Milling machine uses water at various temperatures to encourage surface fibre entanglement to help consolidate the fabric structure and it may also be used for fabric scouring.
- De-twist machine simply untwists the fabric to give a straight flat fabric for further processing.
- MCS scouring machine removes dirt and weaving lubricant from fabric before further treatment (dyeing or finishing) is carried out.

- Dry finisher uses hot air to carry out similar effects to the fabric as the stenter and can impart particular properties to the fabric without the application of steam or water to the fabric surface.

Emissions to the environment from wet processing consist of emissions to air (combustion gases) from two small gas fired boilers used to produce steam for the production process, and emissions to sewer of process effluent following on-site treatment for control of pH and temperature. There are no direct discharges to surface waters, to ground or to groundwater. There are also a number of emission points to air from the various dryers, and fabric finishing machines, although emissions are predominantly of steam. The operator confirms that their processes do not use volatile chemicals which could give rise to emissions to air during the dyeing or drying processes.

The site and its protection

Site setting, layout and history

Woodland Mill is located at National Grid Reference SE 11130 16482, in Longwood, Huddersfield, West Yorkshire. The mill is located on Dale Street and is surrounded by a mixture of residential housing and industrial facilities, with the nearest residential dwellings located immediately adjacent to the site boundary.

The overall site was occupied by buildings first in the 1890s and the dry processing mill was built in the 1930s (originally as a warehouse) whilst the wet processing part of the mill has been recently built on land formerly occupied by garages from the 1980s. The site occupies a rectangular plot along Dale Street, which forms the south west boundary. The site has a car park of made ground to the south east, residential properties to the north west and also to the north east across a narrow strip of open land. The houses to the north east are at a higher elevation than the site. Properties directly across Dale Street are all commercial businesses. The site entrance is directly off Dale Street. The whole of the site slopes slightly to the south east.

There are several Habitats Directive sites (Special Area of Conservation (SAC), Special Protection Area (SPA) or Ramsar) within 10km of the installation, namely, South Pennine Moors SAC, South Pennine Moors Phase 2 SPA, and Peak District Moors (South Pennine Moors Phase 1) SPA. There are no Sites of Special Scientific Interest within 2km of the installation, although within this radius there are several non-statutory conservation sites, namely, Gledholt Woods Local Wildlife Site (LWS), Gledholt Woods Local Nature Reserve (LNR) and Huddersfield Narrow Canal LWS.

The site is located on a secondary (A) aquifer (formally referred to as a minor aquifer) but not within a groundwater source protection zone. The nearest watercourse is Longwood Brook, located just across the road on the other side of Dale Street. A public combined sewer also runs along Dale Street. The southern boundary of the site lies partially within a designated flood zone due to the sites proximity to the Longwood Brook. The site is not located within an Air Quality Management Area (AQMA); the closest AQMA is a Huddersfield AQMA, located c. 2.5 km north east of the installation and declared an AQMA for nitrogen dioxide by Kirklees Council.

Site design: potentially polluting substances and prevention measures

We are required to ensure that installations are operated in accordance with the principles of taking all appropriate measures against pollution and ensuring no significant pollution is caused. We set out below the key features of the Installation for the prevention of pollution of soil and groundwater.

All internal floors are composed of an impervious concrete mix and the outside yard areas are laid with tarmac. The whole of the wet processing area consists of a chemically resistant concrete floor which is fitted with gridded channels surrounding all the wet processing machinery and the chemical storage areas. The gridded drainage channels then lead to the effluent plant. The wastewater drains are constructed of stainless steel pipework and are directly connected with the newly constructed effluent tanks, from where, following pH, temperature and flow control, the wastewater is discharged to public foul sewer.

The main effluent balance tank (25m^3) and flow measurement tank are sited below ground along with two smaller above-ground tanks within an overall bund volume greater than 110% of the capacity of the largest tank. The tanks are all constructed of stainless steel and the balance tank and flow measurement tank have individual blockwork walled bunds around them. The overall bund area also has a slotted covered drainage channel which leads to the discharge point to the sewer. The below-ground tank has two pumps (one for redundancy) which transfer effluent to the above-ground tanks. All tanks have level probes and are alarmed to the dyers office in the event of a high effluent level. The level probes also control pump operation so that both pumps can move effluent more quickly from the below-ground tanks to the above-ground tanks and then to foul sewer.

There are no sub-surface or surface bulk storage tanks for process chemicals on the site. Liquid raw materials are stored in the supplier's containers and there is no bulk storage of liquids in quantities larger than 1000 litres. All larger volume liquid chemicals are stored in intermediate bulk containers (IBCs) in a bunded racking area, from where chemicals are piped directly to the machines where they are used. Liquid chemicals from smaller drums are dispensed directly from the supplier's containers over bunds into stainless steel buckets to be transported to the appropriate dyeing machine in order to minimise the possibility of any large scale accidental spillage. Should any spillages occur they are cleared up immediately according to specific instructions (as detailed in the Environment Management Manual) with which all relevant staff are reported to be familiar.

Materials with the potential to chemically react together, for example oxidising and reducing agents are stored in separate areas. All solid materials are dry stored within a specified dry area in the dye-house buildings in the original shipping package before use. The operator uses dyestuffs predominantly supplied in powder form packed in polythene lined boxes or drums, containing from 5-25kg of dye. These are dry stored in the colour kitchen, adjacent to the dye-house. Individual colours are dispensed by manual weighing from the suppliers packaging. All dyeing operations are of the batch type and require only small quantities of dye to be handled at any one time. Dyestuffs are pre-mixed in separate tanks prior to being loaded into the dyeing machines.

We are satisfied that the measures described above are consistent with aim of preventing pollution of soil and groundwater, and that materials storage and handling is in accordance with Best Available Techniques (BAT) for the control of fugitive releases as set out in the textiles industry BREF.

Under Article 22(2) of the Industrial Emissions Directive (IED) the Operator is required to provide a baseline report containing at least the information set out in points (a) and (b) of that Article before starting operation. The Operator has submitted a site condition report (SCR) as required by Article 22 of the IED, including baseline investigative monitoring data. The baseline report is an important reference document in the assessment of contamination that might arise during the operational lifetime of the Installation and at cessation of activities at the Installation. We have assessed the information submitted by the operator and consider that the condition of soil and groundwater at the site has been adequately characterised and can be used for comparison come permit surrender.

Other than process wastewater the installation produces small quantities of other wastes, typically fibre, packaging materials, metal and redundant chemicals. Where possible waste is recycled on-site, e.g. the reuse of packaging, otherwise it is exported off-site for recovery and/or disposal.

Key issues of the decision

The Key issues associated with this application are the assessment of BAT, in particular water efficiency and energy usage, and the assessment of the discharge of process effluent to sewer. The potential for amenity issues due to noise and/or odour have also been considered.

1. Assessment of BAT

In being regulated as an 'Installation' the facility must meet the requirements of Industrial Emissions Directive (IED). Article 11(b) of the Industrial Emissions Directive and paragraph 5(e), Schedule 7A of the

Environmental Permitting Regulations (EPR) require that we ensure that installations are operated in accordance with the principle of applying BAT. BAT means the available techniques which are the best for preventing or, where that is not practicable, reducing emissions and impacts on the environment as a whole. 'Techniques' within the meaning of BAT include both the technology used and the way an installation is designed, built, maintained, operated and decommissioned. The concept of BAT and how it should be applied is set out in the IED and applies specifically to the 'listed' activities and DAAs set out in Table S1.1 of the permit.

The operator has undertaken a BAT assessment, making a comparison with the BAT Reference Document (BREF) for the Textiles industry. In coming to our decision we have also made reference to the indicative BAT requirements set out in Environment Agency sector guidance EPR 6.05 *The Textile Sector.* Within the sector the key areas for use of BAT to minimise impacts on the environment are as follows:

(a) energy efficiency

(b) efficient use of raw materials and water

(c) 'in-process' controls

- washing
- wool scouring
- bleaching
- mercerising
- dyeing
- finishing

(d) avoidance, recovery and disposal of wastes

(e) emissions to air, and

(f) emissions to water

We discuss the operator's BAT assessment below.

a) Energy efficiency

EPR 6.05 states that the textiles sector is a large user of energy by way of steam raising plant and where stenters (dryers) are used in finishing processes. Indicative BAT is to (where appropriate) consider energy recovery techniques such as:

- the use of heat exchangers for preheating the liquors used in wool scouring, dyeing and scouring of woven yarn for example
- high efficiency dewatering techniques prior to drying
- recovery of heat from stenter exhaust gases
- preheating boiler feed water by flue gas economiser
- optimal maintenance of the stenter burners.

The operator states that steam (from natural gas-fired boilers) is the primary energy source for heating the dye liquor and for drying wet fibre, while electrical energy is used for powering the both the wet and dry processing equipment. The majority of dyeings require the dye liquor to be taken to the boil and held at that

temperature for a period of time. The hot liquor is then discharged to the effluent drain / wastewater system, which includes heat recovery to warm the in-coming process water. The measures outlined in the application for improving energy efficiency are as follows:

- Prevention of heat loss from hot surfaces by the use of appropriate insulation where possible.
- Checking of insulation on a regular basis and any deterioration or damage noted and repaired at the earliest opportunity.
- Selection of wet processing equipment with the lowest water to goods ratio in order to minimise energy use for heating process water.
- Selection of efficient motors, pumps and impellers when replacement of such items is necessary.
- Re-use / recycling of water and liquor in batch processes.
- Recovery of heat from steam condensate in the boiler.
- Re-use cooling water as process water.
- The installation of efficient burner systems.
- Use of LED lighting systems throughout most of the mill.
- Use of own solar panel to generate some electricity.
- Recording of daily energy consumption for comparison with the quantity of dyed fibre produced, with any significant deviations from normal expected levels investigated.

A number of the above measures have been necessary in order for the operator's products to qualify for the EU Ecolabel Certificate (UK/016/003). The operator is also registered under ISO 14001:2015 and ISO 9001:2008, both of which demand that energy efficiency is part of the company's ongoing targets. The operator is also applying to become a member of the Climate Change Levy.

The operator has provided energy usage and energy efficiency figures for 2017, when the new wet processing area came into operation. However they acknowledged that during this reporting period the new process was not running at full capacity and consequently energy usage in the future may increase above the levels that they submitted. They also state that the amount of energy consumed depends on fashion changes within the industry and that different finishes, fabric densities, and colour shades, for example, can have a significant impact on the amount of energy required in the process.

The BREF specifies typical energy consumption per tonne of textile produced from mills finishing woven fabric consisting mainly of wool. The total energy consumption specified in the BREF ranges from 11 - 21 kWh/kg (0.5 - 0.8 kWh/kg for electricity, 10 - 20 kWh/kg for natural gas). The total energy consumption by Wooltex in 2017 was 39.31 GJ/tonne, equating to ~11 kWh/kg, which is at the lower (more efficient) end of the BREF range, albeit reflecting operation at reduced capacity. The operator considers that their energy management techniques meet BAT as set out in the BREF and, based on the information provided, we are satisfied with their conclusion.

b) Efficient use of raw materials and water

EPR 6.05 states that the textiles sector is a large user of water and it also uses a range of fibres and chemicals as raw materials. There are a number of opportunities either to re-use water or to recycle water, and to avoid, as far as practicable, the use of fibres or chemicals containing persistent organic pollutants (POPs). Indicative BAT for the efficient use of raw materials and water is to:

- Use the techniques specified when selecting raw materials (see Table 1 below)
- Use automated fill and liquor temperature control systems

- Reduce liquor ratio by improving washing efficiency for either continuous or batch processing; techniques that will improve washing efficiency and which should be used where possible, include the following:
    a) maintaining a constant liquor ratio across variable load size
    b) in-process separation of the bath from the substrate
    c) internal separation of process-liquor from the washing liquor
    d) mechanical liquor extraction to reduce carry-over and improve washing efficiency
    e) internal countercurrent flow in the batch washing process
    f) combining processes
    g) continuous countercurrent flow of textiles and water (this is now also possible in batch processing)
    h) use of machines with built-in facilities for waste stream segregation and capture
    i) combinations and scheduling to reduce the number of chemical dumps
- Re-use rinse water within the process and re-use the dye bath when technical considerations allow.

Raw materials usage

Process chemicals used in the installation can be sub-divided into three principal groups –

- ***Technical grade chemicals*** - materials of single and known composition, the majority of which are used to control the pH and electrolyte content of scouring, dyeing and wet finishing liquors; in scouring to assist with dirt removal and in dyeing and wet finishing to control the rate of uptake, and levelling of dyes and finishing chemicals.
- ***Proprietary auxiliary chemicals*** - formulated preparations, for example detergents, dye levelling agents and functional finishes. The majority are used in dyeing processes to promote the even uptake of dye, while others are used to achieve a particular technical property in the finished fabric, e.g. resistance to soiling, anti-static properties, mothproofing and flame retardants.
- ***Synthetic organic dyestuffs*** - formulated preparations containing the colourant and adjuncts designed to control strength, prevent moisture adsorption, dust formation and assist solubility in the dyebath. The colouration of undyed (Ecru) fibre is one of the primary functions of the installation.

Indicative BAT for raw material selection and usage is set out in Table 1, along with a summary of how, where applicable, the operator meets the requirement.

Raw material	**Selection techniques (Indicative BAT)**	**Operator compliance**
Natural raw fibres (including wool, cotton flax, etc)	Supplies of natural raw fibres should not contain harmful substances at concentrations above background level.	Fibrous raw materials may carry impurities, which may be removed during wet processes and be released in the wastewater from the installation. These impurities are (1) sheep ectoparasiticides, (2) mothproofing agents, and (3) combing, spinning and weaving lubricants. The operator has attempted to minimise the impact of ectoparasiticides and mothproofers by informing suppliers of their potential impact and requesting test certificates if the provenance of the fibre is suspect. While the operator has almost no control over

Raw material	Selection techniques (Indicative BAT)	Operator compliance
		the presence of ectoparasiticides in the wool, they are investigating the possibility of obtaining test data on some of their incoming raw materials. This is in an effort to identify supplies or suppliers that may be a source of wools that could compromise the effluent discharge with trace pesticide. In terms of combing, spinning and weaving lubricants, the operator seeks to work with customers to ensure that lubricants with a low inherent chemical oxygen demand (COD) loading are used. Many processing lubricants are now "self-scouring" and are more easily removed in the scouring process before dyeing, which also means that detergent use in this process is reduced.
Dyes, pigments and auxiliaries	Dyes and auxiliary chemicals that are not either biodegradable or inorganic should be identified and their use justified.	The majority of technical grade chemicals are water-soluble inorganic compounds and are not expected to bioaccumulate.
	You should also minimise and justify the use of metal or reactive dyes. Where reactive dyes are used these should be high fixation low solvent.	The operator is aware that commercial dyestuffs may contain trace levels of a number of environmental harmful substances and in particular heavy metals arising from the dyestuff manufacturing process. ETAD (Ecological and Toxicological Association of Dyes and Organic Pigments Manufacturers) has set manufacturing limits on the ionic heavy metal content of their commercial dyestuffs and whenever possible the operator uses dyes that conform to this specification by purchasing from ETAD member suppliers. The dyes used predominantly in the installation are not expected to bio-accumulate in the environment. The operator uses reactive dyes that have a very high fixation rate and are solvent and metal free.
	Some azo dyes have carcinogenic breakdown products and their use is restricted by EU Directive 76/769/EEC. The Industry does not use them.	The operator does not use azodyes that can undergo reductive cleavage to form the carcinogenic amines listed in EU Marketing and Use Directive 76/769/EEC.
	Dyes with solid pigments should only be used where they can be abated by clarification.	Not used by operator.
	The affinity (K), liquor ratio (L) and exhaustion (E) of the dyeing process should be optimised: E = K/(K+L)	All dyestuffs used by the operator are chosen on basis of high affinity & exhaustion – wool fibre has high affinity for dyes.

Raw material	Selection techniques (Indicative BAT)	Operator compliance
Levellers and optical brighteners	The most retentive type should be used.	The operator uses levellers Albegal SET and Albegal B; these products have extremely high exhaustion rates so dye is not restrained in the dyeing liquor at the end of the process. The products are readily biodegradable. The operator does not use optical brighteners.
Lubricants	Lubricants should be biodegradable where possible.	The operator uses a lubricant named Lustraffin AS; the product is readily biodegradable
Detergents/ surfactants	Only chemicals with high biodegradability and known degradation products should be used. Alkylphenolethoxylates should be avoided.	No detergents or surfactants are used by the operator. N/A
Biocides	Biocide use should be minimised by other complementary techniques. Biosensors can be used for monitoring.	N/A
Chemicals for bleaching	Hydrogen peroxide based systems have a lower environmental impact Elemental chlorine should not be used. Any use of sodium hypochlorite for decolourising should be justified. Where chlorine-containing bleaches are justifiably used; the emissions of relevant chlorinated organic materials that are formed by the reaction of chlorine with organic material (e.g. chloroform, PCP and residual chlorine) are quantified.	Hydrogen peroxide used as the oxidising agent for bleaching process. N/A The operator does not use sodium hypochlorite for bleaching or machine cleaning, it is used for general floor cleaning only. Approximate maximum usage is 500kg/year. Used only when necessary. Dilution is very high in effluent stream at discharge. PCP or chloroform have not been measured but sewage receiver (Yorkshire Water) is not concerned by level of use.
NaOH	Only “low mercury” NaOH should be used.	Sodium hydroxide (caustic soda) is used to control pH in the scouring process. The operator uses a non-mercury containing caustic soda liquor.
Sequestering agents	DTPA should be used in preference to EDTA or NTA because of its superior degradability.	Not used by the operator.
Defoamers	Only fully biodegradable products with known, safe degradation products should be used.	The operator uses a product (Albaflow CIR) containing a small percentage of defoamer, the product is inherently and readily biodegradable.
Solvents	Wherever possible, coatings using organic solvents should be replaced by aqueous versions.	N/A

Raw material	Selection techniques (Indicative BAT)	Operator compliance
Flame retardants	Any use of brominated flame retardants or short/medium chain chlorinated paraffins should be justified.	The operator can confirm the flame retardant product (potassium zirconium hexafluoride) used in the process is not a brominated type and not a short/medium chain chlorinated paraffin type.

Table 1 - Indicative BAT for raw material selection and usage

We are satisfied that as far as practicable the operator is applying BAT for the usage of raw materials at the installation.

Water consumption

Mains water used in the process is supplemented by a newly commissioned (in 2018) on-site borehole, for which the operator is authorised under abstraction licence ref. NE/027/0011/018 to abstract up to 250m^3/d. The abstracted water, which is metered, is softened prior to use in the production process. Water quality is monitored on a regular basis and water consumption is compared with dyed product output and any significant deviations from normal expected levels are investigated.

Water is used to remove unwanted contaminants from the tops, yarn or fabric in the scouring processes and the rinsing operations that precede and follow colouration; and to apply water-soluble dyes or functional finishes during colouration and related finishing processes. In addition, water is also used to raise stream for heating process water. In this context, the operator says there are no suitable substitutes for water in the process.

Water consumption in the dyeing process is largely dictated by the design of the dyeing machines and the sequence of operation required to complete a dyeing cycle. Consumption depends on the interaction between a number of variables, including (a) the mix of fibre types and fibre format (b) the mix of batch sizes (c) the complexity of each of the individual dyeing operations, and (d) the demand for the more complex non-colouration finishes.

In the majority of cases the operator uses a simple two-bath batch dyeing process, which consists of colour application followed by rinsing, with water from the rinse baths being recycled where possible. Fibre enters these processes dry and wet fibre then passes between individual processes or process steps. There is therefore some carryover of water between process machinery, for example between dyeing/wet finishing and drying.

The operator states that all the dyeing processes and some finishing processes carried out in the installation are water based, and that little water is actually consumed during the production process as the water content of the processed, dried material is similar to that of the incoming material. In this respect, they say that water consumption and wastewater volume are closely related, with the balance made up largely of water vapour arising from drying wet product.

All of the dyeing operations are batch processes. The dyeing machines are all reported to be of the pressurised type and selected for their excellent low liquor to product ratio. They are optimised to ensure best yarn packing density, liquor volume and liquor circulation characteristics, which are consistent with level and reproducible dyeing. The operational volumes of these machines vary with order quantity and yarn or tops required. The dyeing process consists of a number of consecutive operations, all carried out in the same machine, e.g. for yarn dyeing:

- yarn scouring in which the spinning oils are washed off the yarn prior to dyeing
- the “body dyeing”, in which the bulk of the dye required to achieve a given shade is applied

- shading operations, in which small incremental additions of dye are made to build up the final shade
- rinsing operations
- “boiling out”, where the machine is cleaned before the next dyeing operation.

The body dyeing and rinsing operations require separate liquor, achieved by draining and refilling the machine. Depending on the dyes in use, the shading operations may require the addition of cooling water. Therefore, in this respect, the operator states that the total volume of water required to complete all the steps in the sequence is best described as “specific process consumption” and is the product of liquor ratio and the number of full or partial machine fills required to complete all the process steps.

The operator states that they have adopted the following strategy to minimise the consumption of water used in these sequential batch operations:

- the matching of material batch weight to machine capacity
- use of microprocessor based controllers to monitor machine filling and draining
- when appropriate, the use of acid levelling dyes which level well at the boil, to achieve shading and minimise the need for cooling water additions
- where possible, restricting the use of rinse baths to dark shades
- re-use of the spent dyebath if the next dyeing is the same shade
- re-use of spent rinse baths to form the dyebath for the next dyeing in any given machine, with the use of retained liquor in many cases
- careful scheduling so that consecutive dyeing runs are from light to darker thereby avoiding the need for boil out operations.

As the wet processing area was newly installed in 2017, the operator stated in the application that they did not hold historic data for water consumption versus textile throughput. However, they did say that when annualised figures for water use were available they would be able to show that the specific water consumption of the installation would be comparable with those installations cited in the BREF that use similar raw materials and techniques – the stated range being ~36 to 180 litres/kg of textile produced.

In their application, the operator estimated water consumption for dyeing operations to be from 16 to 58 litres/kg of textile produced, depending on whether tops, yarn, or fabric were being processed, and on the number of boil outs required. For finishing operations, water consumption would contribute an additional 3 to 4 litres/kg of textile produced. Therefore over the whole dyeing and finishing cycle, water consumption was estimated to range from 19 to 62 litres/kg of finished fabric. The BREF specifies specific water use per kilogram of textile produced from mills finishing woven fabric consisting mainly of wool. The figure quoted in the BREF as being generally achievable is <200 litres/kg of finished woven fabric.

During our determination of the application we requested further information on water consumption from the operator. They confirmed that for the period June 2018 to June 2019 they processed 3,131,028kg of yarn, top and fabric through the dyeing and finishing plant on site, and that the corresponding water use for this period (including boiler feedwater) was 109,257,000 litres. This value was obtained from the logs of meter readings for both towns water (which is primarily used for the boilers) and the on-site borehole. This gives a specific water consumption of 34.9 litres/kg of textile produced, which is comparable with the data for similar installations quoted in the BREF, and significantly less than the <200 litres/kg figure quoted above.

The operator further explained that their annual specific water consumption will vary year on year, and in particular with textile throughput, i.e. a much lower throughput may actually increase specific water usage as a result of loss of efficiency, and changes in customer requirements (such as to shades or types of finishes and to blends of fibre components) may alter the amount of water needed per kilogram of textile. However, the operator believes the current value is typical of their ability to minimise water use and that specific water consumption in future will always remain well within the BREF range.

The operator considers that the combination of measures taken to ensure optimal machine loading, dye scheduling and the reuse of process water represents BAT for minimising the use of water as a raw material

in the wet processing area, as set out in the BREF. Based on the information provided (including water usage figures), we are satisfied with their conclusion.

(c) In-process controls

Washing

Indicative BAT is that (where appropriate) operators should:

- Install water sub-metering to monitor efficiency of individual systems.
- Substitute overflow washing/rinsing with drain/fill methods or “smart rinsing” techniques based on ultra-low liquor ratios.
- Reduce water & energy consumption in continuous processes by installing high-efficiency washing machinery and introducing heat recovery equipment.
- Interlock water supply with running of the process by use of automatic stop valves.

The operator has stated that although the individual dyeing machines (with integrated scouring/washing) are not metered, each has been purchased from manufacturers who recognise the need to minimise water use. The machines are reportedly brand new, incorporating the most modern technology to allow scouring, dyeing and finishing at very low liquor ratios and to allow the lowest optimum use of chemicals and energy. The operator is monitoring operations at the installation and they expect their overall water use to drop further as experience is gained in machine and process operation, although they point out that their overall water usage is already well below the range specified in the BREF for the dyeing and finishing textile industry (as described in the section above).

In terms of heat recovery, steam is used for heating dye liquor and drying wet fibre. The majority of dyeings require the dye liquor to be taken to the boil and held at that temperature for a period of time. The hot liquor is then discharged to the effluent drain / wastewater system, which incorporates heat recovery to warm in-coming process water. Heat recovery from steam condensate in the boiler is also in place.

As described above, the new wet processing area utilises modern Thies Eco-Bloc HV integrated scouring / washing / dyeing machines. Manufacturer’s literature states that the design of the machines “incorporates the latest innovations and technology related to liquor flow, bath circulation and operating efficiency”. We are satisfied that, in selecting such machines, washing operations are being undertaken with water efficiency in mind.

Wool scouring

Indicative BAT is that (where appropriate) operators should:

- Use raw wool that is free of List I substances.
- Use water efficient techniques e.g. countercurrent rinsing.
- Recover grease.

Wool and wool-blend fibre raw materials may contain trace levels organophosphorus or synthetic pyrethroid sheep ectoparasiticides, which are not removed from the greasy wool by the raw wool scouring process. The operator has attempted to minimise the impact of ectoparasiticides and mothproofers by informing suppliers of their potential impact and requesting test certificates if the source of the fibre is suspect. They are investigating the possibility of obtaining test data on some of their incoming raw materials in an effort to narrow down any supplies or supplier that may be a source of wools that could compromise the effluent discharge with trace pesticide.

As described above, the new wet processing area utilises modern Thies Eco-Bloc HV integrated scouring / washing / dyeing machines. Manufacturer's literature states that the design of the machines "incorporates the latest innovations and technology related to liquor flow, bath circulation and operating efficiency". We are satisfied that in selecting such machines, scouring operations are being undertaken with water efficiency in mind.

Grease recovery is not a significant issue for the operator because their raw wool comes in the form of 'top' which has already been scoured, thereby removing contaminants such as dirt and grease further up the supply chain.

Bleaching

Hydrogen peroxide is preferred to sodium hypochlorite for bleaching, as chlorinated breakdown products are avoided. Indicative BAT is that (where appropriate) operators should:

- Use hydrogen peroxide for bleaching.
- Limit the use of sodium hypochlorite in cases where it is necessary to be used e.g. where high whiteness is required.
- To reduce the formation of hazardous adsorbable organic halogens (AOX) then bleaching should be carried out in a two stage process in which hydrogen peroxide is used in the first stage (which removes organic precursors).

The operator has confirmed that hydrogen peroxide is used for bleaching processes. Dyebath bleaching agents are necessary and are designed to degrade the yellow chromophores, which naturally form in wool during dyeing. Bleaching agents (>95%) remain largely in the process liquor which is passed to the effluent drain / wastewater system.

In the original application the operator stated that they used sodium hypochlorite for machine cleaning but upon further questioning they confirmed that this is not the case. It is not used for the bleaching of textiles, but for general floor cleaning, and only as necessary, with an approximate maximum usage of 500kg/year.

The potential formation of hazardous adsorbable organic halogens (AOX) is not an issue for the operator as sodium hypochlorite is not used for textile bleaching.

Mercerising

Indicative BAT is that where appropriate operators should:

- Recover and reuse alkali from the mercerisation rinsing water.

The operator has confirmed that mercerising (i.e. the treating cotton fabric or thread under tension with caustic alkali to impart strength and lustre) is not undertaken at the installation.

Dyeing

Indicative BAT is that (where appropriate) operators should:

- Use automated dispensing systems for dosing of dyes.

The Thies Eco-Bloc HV dyeing machines utilise industrial based PC controllers such that the flow of materials and all machine functions can be constantly monitored and regulated. The system includes for the programmable automated dosing of dyes and auxiliaries using time and curve profiles.

Finishing

Indicative BAT is that (where appropriate) operators should:

- Minimise waste liquor by using minimal application techniques such as foam or spray application.
- Reuse padding liquors.
- Segregate and dispose of separately unavoidable residual liquors.
- Use formaldehyde free or low formaldehyde preparations (<1% aldehyde content) in cross linking agents.

The operator has confirmed that padding liquors are re-used. Within the 4 bay stenter, treatment chemicals are applied to the fabric surface using padding techniques before the fabric is dried. The chemical is retained within the pad and any excess on the fabric surface is scraped off and returned to the pad applicator. There is no wastage of chemical to the effluent drain / wastewater system. There are no other waste liquors from the fabric finishing processes, and preparations containing formaldehyde are not used.

(d) Avoidance, recovery and disposal of wastes

EPR 6.05 states that waste recovery is possible in the sector, particularly for wool scouring where the wool grease (if applicable) should be dealt with by other routes than landfill.

Besides wastewater the installation produces small quantities of other wastes. Where possible the operator re-cycles wastes on-site or the waste is sent to off-site recovery. The operator states that the installation generates a range of solid wastes, the majority of these are packaging related materials arising from the receipt of tops, yarn, and fabric, but also including metal and redundant chemical products. Cardboard and plastic cones are reused where possible. The following materials are recycled: cardboard (that cannot be re-used), paper, pallets, chemical drums and IBCs, fabric, yarn and wool, polythene and plastic, printer toners and ink cartridges. The quantities of wastes recovered and re-cycled are recorded as part of the waste records maintained by the operator.

In terms of waste minimisation the operator states that there is no opportunity to minimise the use of undyed textile as it represents one of the principal raw materials and forms the basis of finished product. However they state that waste fibre produced during dry processing, principally winding and weaving, is minimised by careful selection of raw materials in the first place along with selection of optimum machine settings and staff training to ensure maximum usage. Any waste fibre from spoiled top, yarn, or fabric which is not of commercial quality and off-cuts from weaving and trimming is sold for recycling.

Opportunities to minimise the bulk consumption of dyestuffs is also reported to be limited as the majority of shades are not achieved with a single dyestuff, but require a combination of three or more dyes. The dyeing technique used is one that that deliberately sets the initial dyeing recipe on the “light” side of the final shade. This prevents over-shade dyeing, which would require stripping back, wasting dye, water, chemicals and energy. The dyestuffs used are specifically selected to have a high level of adsorption which, together with the technique used, results in greater than 98% uptake, thus minimising any wastage.

Furthermore the operator states that the amount of dyes, technical grade and auxiliary chemicals used in the dyebaths is in strict accordance with dyeing ‘recipes’ developed first in trial laboratory dyeings. They use an automated dye kitchen to enable the formulation of extremely precise dyeing recipes, followed by the use of automated dosing controls which dispense only the exact amount required into the dyebath, thus minimising wastage.

(e) Emissions to air

EPR 6.05 states that fibres and chemicals, especially in the finishing operations, may give rise to emissions to air that may require abatement. Emission sources can include boilers and steam generators; stenters for thermal setting, drying and finishing; coating processes; and singeing. Indicative BAT is that (where appropriate) operators should:

- Identify the main chemical constituents of the emissions, including VOC speciation where practicable.
- Achieve the benchmark values for point source emissions unless we agree alternative values.
- Where extraction is necessary, use the minimum extraction rates that enable COSHH requirements to be met.

The operator states that there are no significant emissions to air from the installation, other than water vapour (steam) removed from the wet fibre, yarn and fabric during drying and finishing, and that they do not use volatile chemicals, which could give rise to emissions to air during the dyeing or drying processes.

There are 10 point source emissions to air from the installation, shown in Table 2, consisting of a single boiler emission point (A1), 2 dyeing machine emission points, (A2 & A3), and 7 finishing machine emission points (A4-A10).

Emission point ID	Plant & Machine description	Heating type
A1	Byworth & Loos boilers	Natural gas fired
A2	Obem autoclave	Steam
A3	Thies yarn dryer	Steam
A4	Sperotto Rimar Decofast 1	Steam
A5	Sperotto Rimar Decofast 2	Steam
A6	Sperotto Rimar Decofast 3	Steam
A7	Sperotto Rimar Decofast 4	Steam
A8	Biancalani Airo 24 relax dryer	Natural gas fired
A9	Unitech stenter dryer 1	Steam
A10	Unitech stenter dryer 2	Natural gas fired

Table 2 – Point source emissions to air

The operator identified that the main point source emission to atmosphere was from the two gas fired boilers (Byworth & Loos boilers respectively) which provide steam to the dyeing and finishing machines. Flue gas from the boilers is emitted to atmosphere via a common 15 metre high stack. The boilers are thermally rated at 3500Kg steam (approx. 2.5MW) and 5000Kg steam (approx. 3.5MW) respectively and run on interruptible natural gas. Only two other machines are fired on natural gas, namely, the Biancalani Airo 24 relax dryer and the Unitech stenter dryer 2.

Consideration of point source emissions to air

The operator did not undertake an H1 screening assessment of emissions to air from their gas fired combustion plant, stating that emissions of NOx and carbon monoxide are consistent with modern high efficiency equipment, and which they believed would be of low environmental significance.

All of the other dyeing and finishing machines utilise steam from the boilers and as such are expected to only emit water vapour (steam) to atmosphere. The operator has stated that that these emissions are small scale and contain no organic components. Our view is that this statement should be confirmed through routine monitoring, in particular on the two stenters because across the textiles sector VOC's emissions are typically emitted from such plant, this being a potential area of concern for our regulation of the sector. While our S6.05 guidance includes a BAT benchmark level for VOC in emissions to air of 150 mg/m^3 we consider that the inclusion of an annual monitoring requirement only, for total VOC on the stenter emissions points A9 and A10 respectively is a proportionate requirement to establish / verify whether VOC's are being emitted. The operator stated that their finishing machines have not been tested for VOC's.

Given that an H1 assessment was not carried out we asked some further questions about the boilers and their emissions. The operator re-iterated that they expected emissions to be low given that the boilers are modern, newly installed machines that are regularly serviced at the manufacturer's required intervals. The No.1 Byworth boiler was installed in 2015 and the No.2 Loos Boiler was installed in 2017. Emissions are not regularly monitored however emission checks at the 2019 service showed that carbon monoxide discharged to the atmosphere from the boilers was at 2ppm. NOx was not measured at the service intervals but going forward the operator has proposed to include this as a regular measurement to be reported to the Agency.

We shall permit the installation with an Improvement Condition requiring the operator to undertake an air emissions risk assessment in accordance with our guidance, of combustion emissions (NOx, and CO) from all gas fired plant. This is based on the proportionate, risk-based view considering that:

- the boilers are small, modern units, of 2.5MW and 3.5MW respectively,
- the installation is 2.5km from the Huddersfield AQMAs for NOx, and
- the combustion emission is not 'relevant' under the Habitats Regulations (i.e. it screens out under AQTAG14).

We do not propose to set any emission limit values (ELVs) on the permit at this time. However should the results of the H1 assessment indicate that emissions are not insignificant, we will then consider whether additional control is necessary.

The Improvement Condition is as follows:

- IC1 - to be submitted within 12 months of the date of issue of the permit:

  The operator shall submit to the Environment Agency for approval a report on the assessment of the impact of emissions to air from the installation. The assessment shall be undertaken in accordance with the Environment Agency's air emissions risk assessment guidance, and shall consider the impact of emissions of oxides of nitrogen and carbon monoxide from gas fired combustion plant, with respect to emission points A1, A8 and A10.

(f) Emissions to water

EPR 6.05 states that contaminants, including persistent organic pollutants, present on the raw materials will pass to the wash and rinse waters. Many of these compounds are very difficult to remove in wastewater treatment systems and will be present in final effluents. Wool scouring has the biggest polluting potential in this sector but other processes also have the potential to release Hazardous Pollutants and high organic loads. Operators should aim to avoid colour problems in the effluent and avoid fugitive emissions to water and groundwater. Indicative BAT is that (where appropriate) operators should:

- Identify the main chemical constituents of the treated effluent and assess the fate of these chemicals in the environment.

- For emissions to controlled waters, control the process inputs and consider the use of whole effluent bioassays for the assessment of the complex effluent.
- Use automatic metering and blending systems for dyes and other chemicals.
- If you have on-site waste water treatment you should:
  a) justify the choice and performance of treatment plant.
  b) assess the possibility of recycling treated wastewater.
  c) confirm whether pesticides are present and whether colour removal is practised or planned.
  d) consider the effect of shutdowns and weekend breaks on the treatment process.
  e) provide buffer storage or balancing tanks to even out the concentrations where there is a release of stronger, highly coloured or alkaline wastewaters. If no balancing is provided, show how peak loads are handled without overloading the capacity of the wastewater treatment plant.
  f) consider use of flue gases from other processes to adjust the pH of alkaline effluents.

We are satisfied that the operator has characterised their effluent prior to discharge to sewer and undertaken an impact assessment for the residual chemicals contained within that effluent. As discussed previously we are satisfied that the operator uses automatic metering, blending and dosing systems for dyestuffs and other chemicals.

In terms of on-site waste water treatment, the operator undertakes the basic practice of pH and temperature control prior to discharge to sewer. We do not consider this to be reflective of the intent of EPR 6.05 which discusses specific technical processes such as anaerobic treatment and activated sludge processes; these are the type of processes that would typically be required where trade effluent is discharged directly to a receiving watercourse. This is not the case here as there are no direct discharges of wastewater. We discuss our assessment of the operator's discharge of wastewater to foul sewer later below.

2. Assessment of the discharge of process effluent to sewer

Emissions to sewer from the installation are from the dyeing and finishing processes via the primary effluent treatment system, which controls effluent temperature (via heat recovery), pH and flow volume. This system combines the discharged flows from the machines (i.e. discharges are that are deemed unfit to be recycled back into the system) into an effluent tank via a 24-hour composite sampler. The stainless steel effluent tank acts as a mixing unit for the effluent helping to further cool it before it is pumped to a secondary pair of stainless steel tanks, from which it then flows to the V-notch tank via a flock catcher (which removes extraneous fibre from the effluent). An ultra-sonic level probe above the V-notch acts as a flow meter. From the V-notch tank the effluent discharges into the sewer and then to the Yorkshire Water's Huddersfield WWTW (waste water treatment works). The operator holds a trade effluent consent from Yorkshire Water for their discharge to sewer with the following numeric limits:

Parameter	Limit
Daily volume	400 m^3/day
Flow rate	5 l/s
pH	6 - 10
Maximum temperature	43.3 ºC
Settled COD	6000 mg/l
Settled COD load	900 kg/day

Settleable solids	750 mg/l
Maximum sulphide	2 mg/l

Table 3 - Trade effluent consent limits (Consent ref. Y/4462/16C)

The operator has used monitoring data to undertake an assessment of their process discharge to sewer. They did not use the Environment Agency's H1 screening tool; rather they presented the results of manual calculations with reference to the Agency's freshwater screening tests 1-4. Their assessment considered the following Hazardous Pollutants (as listed in our web guidance):

- the metals, chromium, copper and zinc; traces of these can be present in the spent dye liquors, due to the fact that many dyestuffs are based upon metal species
- the organophosphorus (OP) pesticides, chlorfenvinphos, diazinon and propetamphos, and the synthetic pyrethroid (SP) pesticides, cypermethrin and permethrin; all of these are commonly used sheep ectoparisiticides and/or mothproofing agents, which can be removed from wool in trace amounts during both scouring and dyeing processes.

These substances were assessed against a series of screening tests to determine whether the discharge is "liable to cause pollution" of the receiving watercourse (the River Calder), downstream of Huddersfield WWTW, and thus enable the Environment Agency to determine whether the discharge needs to be controlled with ELVs on the permit. Freshwater screening tests 1-4 are summarised below.

Test 1 checks whether the concentration of the substance in the discharge is greater than 10% of the environmental quality standard (EQS). If it's less than 10% of the EQS then the substance isn't a risk to the environment and no further assessment is required, i.e. the substance is screened out. If it's more than 10% of the EQS then the test is failed and the assessment proceeds to test 2.

Test 2 introduces the dilution available in the receiving water, using river flow data and the daily discharge volume of the effluent. The test checks whether the process contribution (PC) of the substance is greater than 4% of the EQS. The PC is the concentration of a discharged substance in the receiving water after it's been diluted. If the PC is less than 4% of the EQS then the substance isn't a risk to the environment and no further assessment is required. If the PC is more than 4% of the EQS then the test is failed and the assessment proceeds to test 3.

Test 3 considers the predicted environmental concentration (PEC) and requires upstream background concentration (BC) data for the substance. The PEC in the water downstream of the discharge is a combination of the PC and BC. The test checks whether the discharge increases the concentration of the substance in the receiving water by more than 10% of the substance's EQS value. If the difference between the PEC and BC is more than 10% of the EQS then the test is failed. We consider that the substance is potentially a risk to the environment and should be further assessed by the Environment Agency by modelling of the discharge. If the difference between the PEC and BC is less than 10% of the EQS, although the test is passed, the assessment proceeds to test 4 because both tests 3 and 4 must be passed in order for the substance to be screened out.

Test 4 checks whether the PEC is greater than the EQS. If it is greater, then the substance should be further assessed by the Environment Agency by modelling of the discharge. If the PEC is less than the EQS, the test is passed, further modelling is not required, and the substance is considered not to pose a risk to the environment.

The results of our audit of the operator's assessment are shown in Table 4 below. None of the Hazardous Pollutants screened out at Test 1, so the results presented relate to tests 2-4. We have used our H1 screening tool to undertake our own verification of the operator's assessment. These are the numbers shown in the table below and vary slightly from those shown in the Application, however these differences do not materially change the overall outcome of the screening exercise. In this respect our results are the same of those of the operator.

Hazardous Pollutant	EQS LONG TERM / SHORT TERM	Back-ground conc	Test 2		Test 3		Test 4		
			PC < 4% EQS?		PEC-BC > 10% EQS?		PEC > 100% EQS?		
								Test 4a	Test 4b
	µg/l	µg/l	PC µg/l	% of EQS	PEC-BC µg/l	% of EQS	PEC µg/l	% of EQS LT	% of EQS ST
Chromium III	4.7 LT	-	0.0220	0.47	-	-	-	-	-
	32 ST	-	0.0732	0.229	-	-	-	-	-
Copper	1 LT	-	0.0051	0.51	-	-	-	-	-
Zinc	10.9 LT	-	0.2047	1.88	-	-	-	-	-
Chlorfen-vinphos	0.1 LT	-	0.0001	0.08	-	-	-	-	-
	0.3 ST	-	0.0001	0.0412	-	-	-	-	-
Diazinon	0.01 LT	-	0.0000	0.02	-	-	-	-	-
	0.02 ST		0.0000	0.0124	-	-	-	-	-
Propetamphos	0.01 LT	0.005	0.0005	**5.21**	0.00053	5.2	0.00553	55.3	-
	0.1 ST		0.0008	0.844	-	-	0.00585	-	5.85
Cypermethrin	0.0001 LT	0.00004	0.0000	17.57	0.00001	**17.6**	-	-	-
	0.0004 ST		0.0000	9.99	-	-	-	-	-
Permethrin	0.001 LT	0.0005	0.0004	37.17	0.00372	**37.2**	-	-	-
	0.01 ST		0.0029	29.1	-	-	-	-	-

Table 4 - Results of screening assessment for emissions to sewer (Note that test 'fails' indicated in bold text)

The results above show that emissions of chromium III, copper, zinc, chlorfenvinphos, and diazinon screen out at test 2 as the PC's are less than 4% of the relevant EQS, while propetamphos screens out following assessment against tests 3 and 4. The discharge of cypermethrin and permethrin do not screen out because they both fail test 3.

The operator concluded that:

(a) under dry flow conditions in the receiving watercourse for all substances except cypermethrin and permethrin, the respective EQS is highly unlikely to be compromised to a point where damage to the environment will occur; and

(b) detailed modelling by the Environment Agency is required for the release of the substances cyperrmethrin and permethrin.

Consideration of cypermethrin and permethrin

These substances would normally be modelled in detail by the Environment Agency in accordance with our risk assessment guidance. However, in this case, our view is that it is more appropriate to regulate these substances via the use of Improvement Conditions and ongoing monitoring, rather than setting ELVs. This is due to a number of uncertainties, as explained below.

Cypermethrin

The operator's reported effluent monitoring data consisted of 14 sample results obtained during March, August and September 2018. Reported results ranged from <0.141µg/l to 1.40µg/l, including 9 samples reported as <0.701µg/l. The Environment Agency's MRV (minimum reporting value) for cypermethrin in trade effluent is 0.01µg/l, while in cleaner samples the MRV can be as low as 0.002µg/l. Both these MRV's are considerably lower than the concentrations reported by the operator. The operator stated that their reporting limits were raised as a result of the nature of the sample matrix, which meant that their analytical service subcontractor was unable to report down to their limit of detection (LoD) for the substances analysed. They also stated that this was a common issue with the analysis of textile effluents. They confirmed that they used an MCERTS / UKAS accredited laboratory for their sample analysis. Our view is, given the fact that the majority of the sample concentrations reported are well above our MRV (which the operator has taken at face value in line with our guidance), this casts doubt on the outcome of their screening assessment. Arguably, with more robust data and/or analysis, the substance may screen out.

This possibility needs to be balanced with the expectations around the removal efficiencies achieved at the WWTW and whether such a high removal rate, of about 98% according to our STRF (sewage treatment reduction factor) for cypermethin, is actually realised. Yorkshire Water currently have no limit for cypermethrin on their environmental permit for the discharge from Huddersfield WWTW. If actual removal rates are less than the STRF then there is potential for the assessment to be underestimating the impact. We acknowledge that the operator has correctly used Environment Agency published figures for removal efficiency.

Furthermore the operator stated that during average flow (as opposed to low flow) conditions in the river, which would be expected for most years, it is likely that concentrations of contaminants due to operations at their site would be quite difficult to detect analytically. They point out that the Environment Agency's monitoring data for the River Calder indicates that detection limits (or reporting limits) for permethrin are approximately 3 times higher than the EQS meaning that it would be difficult to determine the real impact that permethrin discharges are having upon the river, and that the EQS for cypermethrin in surface waters is so low that almost any detection of the substance in any effluent is likely to lead to a theoretical impact on the receiving environment.

It should be noted that even the Environment Agency's MRV is 125 times greater than the annual average EQS for cypermethrin of 0.00008µg/l, which supports the operator's assertion that, under such circumstances, determining whether or not there is an impact in the watercourse is problematic.

Permethrin

The operator's reported effluent monitoring data consisted of the following:

- 3 sample results for cis-permethrin obtained during March 2018. All 3 results were reported as <0.154µg/l. The Environment Agency's MRV for cis-permethrin in trade effluent is 0.01µg/l.
- 3 sample results for trans-permethrin obtained during March 2018. The results ranged from <0.146µg/l to 0.179µg/l. The Environment Agency's MRV for trans-permethrin in trade effluent is 0.005µg/l.
- 9 sample results for total permethrin obtained during August and September 2018. The results ranged from <1.49µg/l to 10.2µg/l, including 8 samples reported as <1.49µg/l. Although a specific MRV for total permethrin is not available, our expectation is that it will be considerably less than the operator's lowest figure of 1.49µg/l, in line with the MRVs for the other permethrin species above.

For broadly the same reasons as those outlined for cypermethrin, our view is that the quality of the reported data for permethrin means that the operator's assessment is potentially unreliable.

Environmental impact of cypermethrin and permethrin

We have considered whether the discharge of these substances could be having an impact in the receiving watercourse. The River Calder immediately downstream of Huddersfield WWTW is compliant with the EQS for cypermethrin, suggesting that the existing discharge from the Wooltex site is insufficient to cause an EQS failure. For permethrin the picture is a little less clear and while the Water Framework Directive (WFD) status of the River Calder has been reported as 'high' as recently as 2015, due to issues with the limit of detection, it is now not reported. Our understanding is that any problems with permethrin downstream of Huddersfield appear to be more associated with textile dyers / finishers in the Dewsbury WWTW sewerage catchment, not Huddersfield WWTW.

The Environment Agency recognises that the release of residual pesticides in effluent discharges is an ongoing issue within the textiles sector. These substances tend not to be directly controllable by operators. They are not applied in the textile production process and are not present on all incoming wools. Wooltex state that they are difficult to analyse in wool and from their discussions with commission customers it is almost impossible to trace wool back to its absolute origin to check if chemicals have been applied on-farm. The Environment Agency is currently working with the wider textile sector on a programme of process improvement in order to reduce the concentration of residual pesticides in company effluents.

Proposal

Permethrin and cypermethrin

Rather than set emission limits we propose to include Improvement Conditions (IC3 & IC4) together with effluent monitoring on the permit. The first Improvement Condition (IC3) will require the operator to submit a plan (for approval) for minimising, as far as reasonably practicable, wool raw materials containing permethrin and cypermethrin to be received at the installation. This could be, for example, through the use of pre-acceptance and/or acceptance checks, to ensure that the raw materials they receive on-site is as expected in terms of quality. Such a system of checks would build upon what Wooltex are already doing. They are investigating the possibility of obtaining test data on some of their incoming raw materials in an effort to identify supplies or suppliers that may be a source of wools that could compromise their effluent discharge with these trace pesticides. They have stated that they will also carry out the analysis of any new yarn types and tops from new suppliers for these substances, to try to gauge the level of threat that these new raw materials could pose. Furthermore they state that the analysis of the effluent produced by the process must be an on-going exercise. This will be formalised through our requirement for monthly effluent monitoring for permethrin and cypermethrin.

The second Improvement Condition (IC4) will require the operator to submit a report which reviews the implementation of their pesticide minimisation plan and sets out any amendments to the original plan deemed necessary to control residual pesticide contamination of incoming wool raw materials. The Improvement Conditions are as follows:

- IC3 – to be submitted within 6 months of the date of issue of the permit:

  The operator shall submit to the Environment Agency for approval a 'pesticide minimisation plan' in order to minimise as far as reasonably practicable wool raw materials containing permethrin and cypermethrin being received at the installation. The plan shall include (but not be limited to) consideration of the following:

  (a) an appraisal of the scale of residual pesticide contamination

  (b) identification and analysis of permethrin and cypermethrin present on incoming wool raw materials

  (c) supply chain checking: pre-acceptance checks and verification checks upon receipt at installation, e.g. use of test certification

  (d) proposals for analysis of process wastewater samples, including test methods, limits of detection, etc

  (e) how to demonstrate the effectiveness of the plan, including proposed length of initial implementation period.

  The plan shall be implemented upon written approval by the Agency.

- IC4 – to be submitted within 3 months of the end of initial implementation period agreed under IC3:

  The operator shall submit to the Environment Agency for approval a written report reviewing the effectiveness of their approved 'pesticide minimisation plan' during the initial implementation period. The report shall also set out any amendments to the original plan necessary to ensure permethrin and cypermethrin contamination of incoming wool raw materials is minimised.

Other residual pesticides

Based on the effluent monitoring data contained in the application the other pesticides screened out as insignificant. However, we recognise that the nature of incoming raw materials can change depending on the source of supply, ongoing contracts, etc, and therefore we will require that these other pesticides, namely chlorfenvinphos, diazinon, and propetamphos are monitored quarterly to ensure that levels remain broadly consistent with those in the permit application. This shall enable any significant increases to be identified and investigated as deemed appropriate.

3. Consideration of impacts on amenity

Noise

A quantitative noise impact assessment was not submitted as part of the application. The operator stated that while all major items of equipment generate some noise, the equipment used in the new wet processing area was not inherently noisy and there was no potential for noise nuisance, despite the proximity of residential properties (approximately 10m from the site boundary). The operator did acknowledge that the existing dry weaving process was noisy, but that it was well insulated and had been running for many years at the site without cause for public complaint.

For new installations and sites where a permit variation is being made which includes the potential for the noise risk to increase, we would normally expect a BS4142 noise survey to be included in the application. However given that:

i. the installation is an existing facility located in an area comprising an established mix of residential and industrial properties
ii. all equipment is located indoors, and
iii. there is a historical lack of any significant amenity issues due to noise,

we took a risk based decision not to require a quantitative impact assessment during our determination of the application.

Our understanding is that when the operator applied for planning permission for the factory extension to accommodate the new wet processing area they initially had their hours of operation restricted. The operator carried out noise monitoring to demonstrate that noise from the site would not be an issue with local residents and the restrictions were subsequently lifted. Further noise reduction works were completed in May 2019, to relocate the existing air conditioning units indoors and fit them with silencers.

We consulted the local authority, Kirklees Council, as a statutory consultee during the early stages of our determination. They confirmed that, while they had received intermittent complaints regarding noise in the past due to steam being released from a faulty process valve, the complaints were promptly investigated by the company and resolved. Therefore, Kirklees Council had no amenity concerns with regard to the installation.

Subsequent to the above consultation, the council informed us that they had received a complaint pertaining to night time noise from the installation during the summer of 2019. They reported that upon investigating the complaint with the company no obvious cause was established. The operator reported that the installation was operating normally at the time of the complaint, with no known faults. In addition they said that they undertake regular night time noise patrols and that nothing was reported by their team. The council confirmed that while they were going to discuss the matter further with the complainants, they had no specific ongoing concerns.

Our view is that the amenity risk due to noise from the installation remains low, however due to these recent night time noise complaint and the proximity of local residents we consider it appropriate (and proportionate) to require the operator, through the use of an Improvement Condition on the permit (IC2), to undertake a noise survey in accordance with *BS 4142:2014+A1:2019, Methods for rating and assessing industrial and commercial sound*, in order to determine the potential for impact at nearby residential properties and thereby confirm the conclusions from their application. Should the survey indicate the potential for an adverse impact at residential receptors, the Improvement Condition further requires the operator to review their existing control measures; investigate the possibility for additional mitigation to reduce emissions; and propose a timetable for making any such improvements.

The Improvement Condition is as follows:

- IC2 - to be submitted within 12 months of the date of issue of the permit:

  The operator shall submit to the Environment Agency for approval a report on the assessment of the impact of noise emissions from the installation. The assessment shall be undertaken by a suitably qualified noise and acoustics professional and shall follow the procedure within British Standard BS 4142: 2014+A1:2019, *Methods for rating and assessing industrial and commercial sound*.

  Should the noise impact assessment indicate an adverse impact (or worse) at residential receptors, the assessment report should also contain the following information:

  a) a review / appraisal of the existing noise control measures at the installation;
  b) an investigation into the potential for improvements to be made to reduce noise emissions, e.g. either physical abatement, enhanced management / operational controls, or a combination of both;
  c) a proposed timescale for implementing any such identified improvements.

Odour

The operator states in their application that the chemicals and processes used in the installation do not give rise to significant odour that could be considered a nuisance. However they acknowledge that wet processing of textile fibre can give rise to mild odour (as wet wool fibre has a slightly sharp smell) in the vicinity of the processing equipment and the use of acetic and formic acids during some dyeing can result in a smell which is plainly detectable inside the mill building. They say that the dye-house is ventilated to atmosphere and small amounts of water vapour (steam) issues from the vents to the atmosphere above the

dye-house area, but odours are generally not detectable even within the general site boundary. They report in the application that no odour complaints from any of the nearby domestic properties or from the commercial properties directly across the road had been received.

We consulted the local authority, Kirklees Council, as a statutory consultee during the early stages of our determination. They confirmed that they had never received any complaints about odour from the installation and therefore they had no amenity concerns.

Subsequent to the above consultation the council informed us that they had received a complaint pertaining to odour from the installation during the summer of 2019. They reported that upon investigating the complaint with the company no obvious cause was established. The operator reported that the installation was operating normally at the time of the complaint, with no known faults. The council confirmed that while they were going to discuss the matter further with the complainants, they had no specific ongoing concerns.

One potential odour issue from textile production is from the stenters where it is thought that residual spinning oils and lubricants used in the weaving process can be released from the fabric as it passes through the stenter (which involves a heating/fixing stage) and be emitted to air. The majority of such oils and lubricants should be removed from the incoming raw materials during wet processing upstream of the stenter and be discharged in the mill wastewater. The operator states that many processing lubricants are now “self-scouring” and are more easily removed in the scouring process before dyeing. This would reduce the residual carry over onto the finished fabric and therefore for potential for odorous stenter emissions.

The issue of stenter emissions and the like will be considered further during the review of the Textile Industry BREF, the process for which has commenced within the EU. We have included on the permit the requirement for the operator to monitor oil mists from the stenters and other finishing processes which involve the use of heat (from emissions points A4-A10). This is consistent with other (but not necessarily all) installations permits within the textile sector.

Our current view is that the amenity risk due to odour from the installation is low. However in recognising the potential for odorous emissions from the installation, the operator submitted an Odour Monitoring Plan with their application and confirmed that they carry out routine (monthly) odour monitoring at the site. They also have a written procedure for investigating any odour complaints received. They state that should any identified odour issues not be easily or quickly rectified then they will submit the odour complaint form together with possible improvement techniques and a timescale for implementation to the Environment Agency for discussion / agreement.

Decision checklist

Aspect considered	Decision
Receipt of application	
Confidential information	A claim for commercial or industrial confidentiality has not been made.
Identifying confidential information	We have not identified information provided as part of the application that we consider to be confidential.
Consultation	
Consultation	The consultation requirements were identified in accordance with the Environmental Permitting Regulations and our public participation statement. The application was publicised on the GOV.UK website. We consulted the following organisations: • Kirklees Council • HSE • Yorkshire Water The comments and our responses are summarised in the consultation section.
Operator	
Control of the facility	We are satisfied that the applicant (now the operator) is the person who will have control over the operation of the facility after the grant of the permit. The decision was taken in accordance with our guidance on legal operator for environmental permits.
The facility	
The regulated facility	We considered the extent and nature of the facility at the site in accordance with RGN2 'Understanding the meaning of regulated facility', and Appendix 2 of RGN 2 'Defining the scope of the installation'. The extent of the facility is defined in the site plan and in the permit. The activities are defined in table S1.1 of the permit.
The site	
Extent of the site of the facility	The operator has provided a plan which we consider is satisfactory, showing the extent of the site of the facility. The plan is included in the permit.
Site condition report	The operator has provided a description of the condition of the site, which we consider is satisfactory. The decision was taken in accordance with our guidance on site condition reports and baseline reporting under the Industrial

Aspect considered	Decision
	Emissions Directive.
Biodiversity, heritage, landscape and nature conservation	The application is within the relevant distance criteria of sites of heritage, landscape or nature conservation, and/or protected species or habitat, as follows: **Habitats (European) sites** (located c. 6.6 km west of the installation at the closest point) • South Pennine Moors SAC • South Pennine Moors Phase 2 SPA • Peak District Moors (South Pennine Moors Phase 1) SPA The installation is not considered '*relevant'* for assessment under the Agency's procedures which cover the Conservation of Habitats and Species Regulations 2017 (Habitats Regulations). This was determined by referring to the Agency's guidance 'AQTAG014: Guidance on identifying '*relevance'* for assessment under the Habitats Regulations for installations with combustion processes.' There are no other *'relevant'* emissions to air from the installation, thus no detailed assessment of the effect of the releases from the installation on the above SAC and SPAs is required. **Local Nature Reserve** • Gledholt Woods (located c. 1.7 km east of the installation) **Local Wildlife Sites** • Gledholt Woods • Huddersfield Narrow Canal (located c. 0.6 km north west of the installation) We have assessed the application and its potential to affect all known sites of nature conservation, landscape and heritage and/or protected species or habitats identified in the nature conservation screening report as part of the permitting process. We consider that the application will not affect any sites of nature conservation, landscape and heritage, and/or protected species or habitats identified. We have not consulted Natural England on the application. The decision was taken in accordance with our guidance.
Environmental risk assessment	
Environmental risk	We have reviewed the operator's assessment of the environmental risk from the facility. The operator's risk assessment is satisfactory. See Key Issues section for further details on our assessment of emissions to sewer from the installation.
Operating techniques	
General operating	We have reviewed the techniques used by the operator and compared these

Aspect considered	Decision
techniques	with the relevant guidance notes, namely EPR 6.05 - The Textile Sector, and the BREF for the Textiles Industry, and we consider them to represent appropriate techniques for the facility. The operating techniques that the applicant must use are specified in table S1.2 in the environmental permit.
Operating techniques for emissions that do not screen out as insignificant	Emissions of cypermethrin and permethrin cannot be screened out as insignificant. We have assessed whether the proposed techniques are BAT. See Key Issues section for further information.
Operating techniques for emissions that screen out as insignificant	Emissions of Chromium III, Copper, Zinc, Chlorfenvinphos, Diazinon, and Propetamphos have been screened out as insignificant, and so we agree that the applicant's proposed techniques are BAT for the installation.
Permit conditions	
Use of conditions other than those from the template	Based on the information in the application, we consider that we do not need to impose conditions other than those in our permit template.
Improvement programme	Based on the information on the application, we consider that we need to impose an improvement programme. See Key Issues section for further information.
Emission limits	We have decided that emission limits are not required in the permit. See Key Issues section for further information.
Monitoring	We have decided that monitoring should be carried out for the parameters listed in the permit, using the methods detailed and to the frequencies specified. See Key Issues section for further information.
Reporting	We have specified reporting in the permit.
Operator competence	
Management system	There is no known reason to consider that the operator will not have the management system to enable it to comply with the permit conditions. The decision was taken in accordance with the guidance on operator competence and how to develop a management system for environmental permits.
Relevant convictions	The Case Management System has been checked to ensure that all relevant convictions have been declared. No relevant convictions were found. The operator satisfies the criteria in our guidance on operator competence.
Financial competence	There is no known reason to consider that the operator will not be financially able to comply with the permit conditions.

Aspect considered	Decision
Growth Duty	
Section 108 Deregulation Act 2015 – Growth duty	We have considered our duty to have regard to the desirability of promoting economic growth set out in section 108(1) of the Deregulation Act 2015 and the guidance issued under section 110 of that Act in deciding whether to grant this permit. Paragraph 1.3 of the guidance says: "The primary role of regulators, in delivering regulation, is to achieve the regulatory outcomes for which they are responsible. For a number of regulators, these regulatory outcomes include an explicit reference to development or growth. The growth duty establishes economic growth as a factor that all specified regulators should have regard to, alongside the delivery of the protections set out in the relevant legislation." We have addressed the legislative requirements and environmental standards to be set for this operation in the body of the decision document above. The guidance is clear at paragraph 1.5 that the growth duty does not legitimise non-compliance and its purpose is not to achieve or pursue economic growth at the expense of necessary protections. We consider the requirements and standards we have set in this permit are reasonable and necessary to avoid a risk of an unacceptable level of pollution. This also promotes growth amongst legitimate operators because the standards applied to the operator are consistent across businesses in this sector and have been set to achieve the required legislative standards.

Consultation

The following summarises the responses to consultation with other organisations, our notice on GOV.UK for the public, newspaper advertising, and the way in which we have considered these in the determination process.

Responses from organisations listed in the consultation section

Response received from
Kirklees Council
Brief summary of issues raised
The Council's Pollution & Noise Control team stated that they had received intermittent complaints regarding noise from steam being released from a process valve. They said that the complaints were investigated by the company promptly and resolved. They had never received any complaints about odour from the process. Consequently therefore they said that they had no concerns regarding the company's impact on the amenity of the surrounding environment.
Summary of actions taken or show how this has been covered
No action following this response, but see also Key Issues section for details of further communication with Kirklees Council during our determination of the application

Responses were not received from the other organisations that were consulted, namely, HSE and Yorkshire water respectively.