Independent Air Quality & Odour Specialists

H1 SCREENING ASSESSMENT FOR A CHEMICAL DISPENSING BOOTH AT FUJIFILM DIOSYNTH BIOTECHNOLOGIES LIMITED FACILITY

INTRODUCTION

This Technical Note provides an H1 screening assessment for a chemical dispensing booth located at the Fujifilm facility to the southeast of Billingham. The assessment has been prepared in response to queries raised by the Environment Agency following the submission of a permit application for the facility. These were as follows:

> *Emission point A12 – you have mentioned that this emission point was operational but was not included in the permit. This is from dispensing booth and emissions are of VOCs. Kindly confirm if this is a LEV or an emission point to air, i.e. to where do the emissions release. Provide the following in information for this emission point:*
>
> - *How often are there VOC emissions from A12;*
> - *What are the sources of these VOC emissions;*
> - *An estimated characterisation of the VOCs based on chemical usage and reactions;*
> - *A quantitative risk assessment for the VOCs in line with the guidance 'Air emissions risk assessment for your environmental permit'.*

Please note, the emission point reference has now changed to Emission Point A11.

EMISSIONS FROM EMISSION POINT A11

The principal VOC emissions from the dispensing booth include acetone, acetonitrile, ethanol and methanol. The booth is generally only used for the dispensing of these chemicals (i.e. there is minimal mixing of chemicals) and there are no chemical reactions taking place and emissions would be from evaporation processes from these liquids. Therefore, it is expected that VOC emissions of acetone, acetonitrile, ethanol and methanol would take place. The quantities dispensed vary but 2025 data indicate that the following quantities were dispensed:

- acetonitrile – 2,560 litres/annum;
- acetone – 66 litres/annum;
- ethanol - 2,328 litres/annum; and
- methanol – 56 litres/annum.

Gair Consulting Limited, Osterley, Piddletrenthide, Dorchester, Dorset DT2 7QU
Tel: 01869 278889 Email: ajg@gairconsulting.com
Registered in England No. 4934961

Based on 2025 operational data, the dispensing booth is estimated to operate for around 3,500 hour per annum (40% of the time).

The quantities utilised are very small and emission to air from the dispensing booth are likely to be low. The dispensing booth is fitted with a three-stage high efficiency filtration system that includes:

- pre-pad filters located behind removable grilles;
- fine dust filters (G4 and F8) which are 95% efficient also located behind removable exhaust grilles; and
- HEPA filters (H14) which are 99.995% efficient.

It is assumed that emissions to air from the dispensing booth would be at a concentration of 100 mg/m^3. There have been no measurements of VOC emissions from this emission point and it is difficult to quantify these emissions. However, it is considered that a concentration of 100 mg/m^3 would be representative of a worst-case.

Emissions to air from the vent emit via a single stack at a height of 6.8 m. The stack is located on a building with a maximum height (apex) of 7.4 m.

LOCATION OF SENSITIVE RECEPTORS

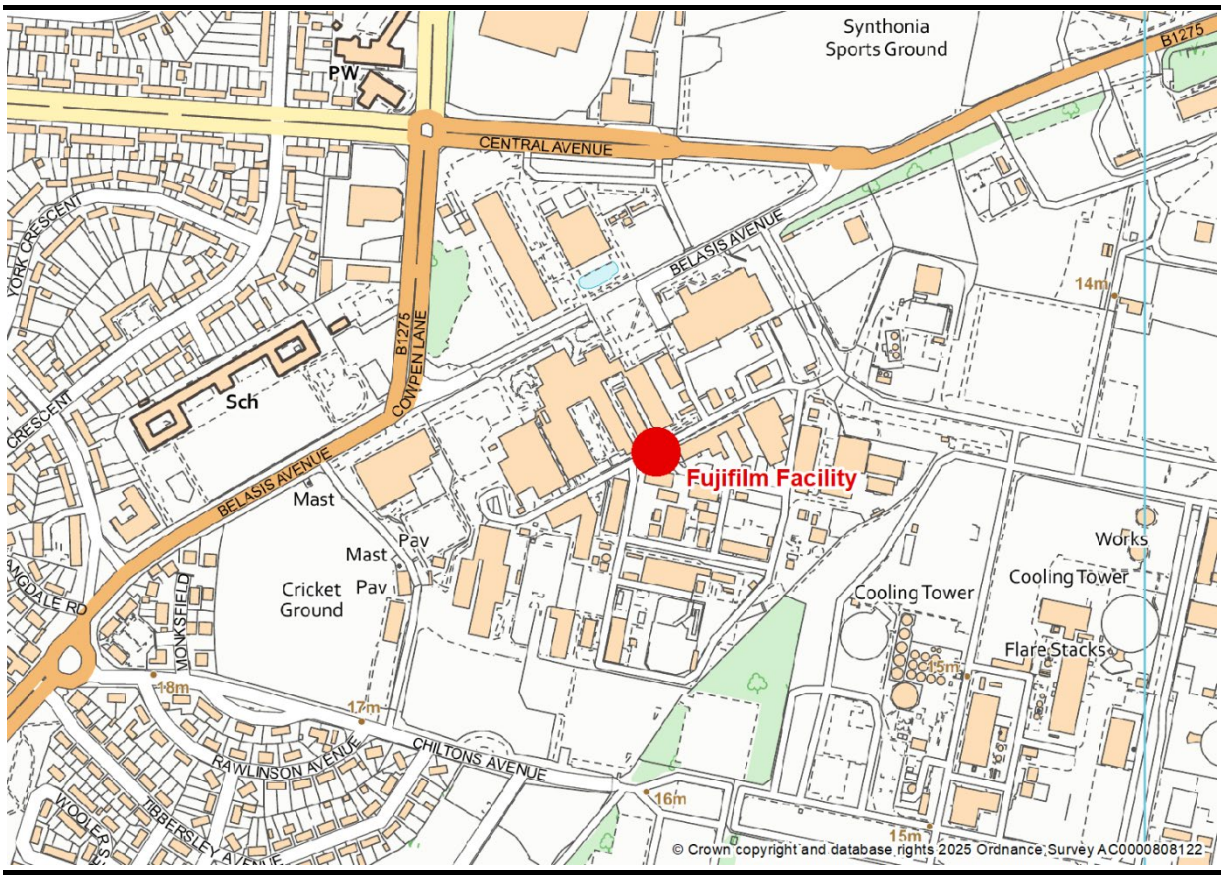
The location of the Facility is presented in *Figure 1*. The facility is located within an industrial area to the southeast of Billingham, Stockton-on-Tees. The nearest residential receptor is located approximately 420 m to the west of the facility.

There are no emissions to air that would have an adverse impact on habitat sites. Therefore, impacts on habitats have been excluded from the assessment.

BACKGROUND AIR QUALITY

Background concentrations of the VOCs emitted from the dispensing booth are not routinely monitored in the UK. Furthermore, it is anticipated that background levels of these emissions would be very low and well below the respective environmental assessment levels (EALs). Therefore, it is assumed that background concentrations would zero.

FIGURE 1: FACILITY LOCATION



H1 ASSESSMENT

The dispensing booth stack is lower than the building apex within which it is located. Consequently, the stack for the dispensing booth is less than 3 m above the building on which it is located. Therefore, the effective height of release of the dispensing booth emission would be 0 m and the long-term dispersion factor would be 148 µg m^{-3} per g s^{-1} and the short-term dispersion factor would be 3,900 µg m^{-3} per g s^{-1}.

The EALs are those provided by the Environment Agency's Risk Assessment Guidance and are all derived from the old EAL derivation method from EH40/2001 occupational exposure limits. These are an annual mean concentration which is the 8-hour time weighted average divided by 100 and an hourly mean concentration which is the 15-minute short term exposure limit divided by 10. An EAL for ethanol is not provided by the Environment Agency but there are occupational exposure limits within the current version of EH40. Therefore, an EAL (annual mean of 19,200 µg/m^3) for ethanol has been derived based on the occupational exposure limit of 1,920 mg/m^3 as the 8-hour time-weighted average.

It is noted that the use of the old EAL derivation method does not comply with current Environment Agency guidance for deriving new EALs [1]. However, since all other pollutants included in this assessment utilise this method it is deemed appropriate. Nevertheless, a sensitivity analysis is also provided. Ethanol and methanol are similar compounds. They are both alcohols with ethanol having two carbon atoms (CH_3CH_2OH) and methanol having only one (CH_3OH). The long-term exposure limit (8-hour time weighted average) for methanol (266 mg/m³) is substantially more stringent than for ethanol (1,920 mg/m³) and is more than seven times lower. Therefore, for the sensitivity analysis the EAL for methanol is used for assessing the impact of ethanol emissions.

A summary of the H1 screening for long-term impacts is presented in *Table 1* and for short-term impacts in *Table 2*.

TABLE 1: H1 SCREENING FOR LONG-TERM IMPACTS

Parameter	Annual Mean Acetone	Annual Mean Acetonitrile	Annual Mean Ethanol	Annual Mean Methanol
Emission concentration (mg/m³)	100	100	100	100
Emission rate (g s⁻¹) (a)	0.428	0.428	0.428	0.428
Operating mode (%) (b)	40%	40%	40%	40%
Dispersion factor (µg m⁻³ per g s⁻¹)	148	148	148	148
Air quality objective (µg m⁻³)	18,100	680	19,200	2,660
PC (µg m⁻³)	25.3	25.3	25.3	25.3
PC as %age of AQO	0.1%	3.7%	0.1%	1.0%
Background concentration (µg m⁻³) (c)	-	-	-	-
PEC (µg m⁻³)	25.3	25.3	25.3	25.3
PEC as %age of AQO	0.1%	3.7%	0.1%	1.0%
Screens out	*Yes*	*Yes*	*Yes*	*Yes*

(a) Based on a volume flow rate of 15,390 m³/h (4.28 m³/s)
(b) Based on 2025 data, the dispensing booth operates for around 3,500 hours per annum
(c) Background concentrations assumed to be zero

The PCs for ethanol and methanol are 1% or less of the EALs and would be assessed as not significant. The PC for acetonitrile is 3.7% and is potentially significant. However, background concentrations are likely to be very low and have been assumed to be zero. The PEC would be well below 70% of the EAL and it is very unlikely that the EAL would be exceeded. Therefore, long-term (annual mean) concentrations of acetonitrile, ethanol and methanol can be screened out from requiring further assessment.

For the sensitivity analysis where the EAL for methanol is used for ethanol, the PC would be 1.0% of the methanol EAL and would be screened out from requiring further assessment. Furthermore, since background concentrations are assumed to be zero, the EAL for ethanol would need to be 36 µg/m³ (25.3/70%) in order that the PEC did not exceed 70%. Therefore,

[1] Methodology for the scientific derivation of Environmental Assessment Levels (EALs), Chief Scientist's Group Report (March 2025)

it is concluded that an EAL derived using the March 2025 Environment Agency guidance would not indicate that ethanol emissions would require further assessment.

TABLE 2: H1 SCREENING FOR SHORT-TERM IMPACTS

Parameter	1-Hour Mean Acetone	1-Hour Mean Acetonitrile	1-Hour Mean Methanol
Emission concentration (mg/m^3)	100	100	100
Emission rate (g s^{-1}) (a)	0.428	0.428	0.428
Operating mode (%) (b)	100%	100%	100%
Dispersion factor (µg m^{-3} per g s^{-1})	3,900	3,900	3,900
Averaging time conversion factor (unitless)	1	1	1
Air quality objective (µg m^{-3})	362,000	10,200	33,300
PC (µg m^{-3})	1,667	1,667	1,667
PC as %age of AQO	0.5%	16.3%	5.0%
Background concentration (µg m^{-3})	-	-	-
PEC (µg m^{-3})	1,667	1,667	1,667
20% of the AQO minus the background (µg m^{-3})	72,400	2,040	6,660
Screens out	*Yes*	*Yes*	*Yes*

(a) Based on a volume flow rate of 15,390 m^3/h (4.28 m^3/s)
(b) Assumed to operate continuously for short-term impacts

The PCs for acetone and methanol are less than 10% of the EALs and would be assessed as not significant and can be screened out. The PC for acetonitrile at 16.3% exceeds 10% of the EAL and would be assessed as potentially significant. However, the PC is less than 20% of the difference between the AQO and the background assuming the background concentrations are zero. Therefore, short-term impacts for all emissions can be screened out.

CONCLUSION

The H1 screening indicates that long-term impacts can be screened out as predicted concentrations (PC) are less than 1% of the EALs or the PECs are less than 70% of the EAL. The H1 screening indicates that short-term impacts can be screened out as predicted concentrations (PC) are less than 10% of the EALs or the PCs are less than 20% of the difference between the EAL and background concentrations.