

Air Emissions Screening Assessment

Caswell Production Facility

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REPORT

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Appendix A H1 Tool

1 INTRODUCTION

- 1.1.1 This report provides a screening assessment of point source emissions to air from the Caswell Production Facility. The installation is located at Caswell, Towcester, Northamptonshire, UK, NN12 8EQ.
- 1.1.2 The screening assessment has been undertaken to support a permit variation application that introduces changes to the emissions to air from the facility.

2 EMISSIONS TO AIR

2.1 Introduction

- 2.1.1 A screening assessment of point source emissions to air from the Lumentum installation has been carried out. The assessment has been completed in accordance with the Environment Agency's *Risk Assessments for your environmental permit* using the latest version of the Environment Agency's H1 software (version 9).
- 2.1.2 The scope of the assessment has covered the following aspects:
- Release point characteristics,
 - Air emissions screening,
- 2.1.3 Air emissions screening using the H1 software has not identified emissions that warrant further modelling. The H1 tool can be found in **Error! Reference source not found.**to this Environmental Risk Assessment.

2.2 Emissions Release Points

- 2.2.1 Emissions to air will include Volatile Organic Compounds (VOCs) from eleven stacks. There are numerous other emission points from the site, however these are associated with local exhaust ventilation systems used for safety purposes, fume cupboards and/or emergency systems for use by the fire brigade. These emission points release clean air other than an emergency and/or are not in use during normal operations and therefore are not considered within this assessment.
- 2.2.2 The H1 tool does not have a specific EAL for VOCs and therefore several proxy substances have been used instead. For the majority of the stacks, the VOCs are mainly acetone or 2-propanol and therefore the total VOCs concentration has been compared with the EAL for acetone and 2-propanol.
- 2.2.3 Stack A15/B30 Stack 29 will emit some chlorobenzene. The H1 tool does not have specific EAL for chlorobenzene and therefore the total VOC concentration has been compared with the Benzyl Chloride and Benzene EALs.
- 2.2.4 Stack Mod12 Soxhlet/B30 will emit a phthalate ester which is made up of isomers of dinonyl phthalate. Initially, a proxy (dibutyl phthalate) was proposed for use in the H1, However, the Environment Agency's enhanced pre-application requested that an EAL was derived for the pollutant and that detailed dispersion modelling be undertaken. This was undertaken and the results can be found in the Tetra Tech report *Air Quality Assessment Rev 0* dated 29th April 2026.
- 2.2.5 Dinonyl Phthalate has not been considered further in the H1 as a detailed dispersion assessment has been carried out.
- 2.2.6 The proxy substances used in the H1 are summarised in Table 2-1.

Table 2-1: Proxy substances used in H1

Main components of VOCs	Relevant Stack	Proxy substance used in H1
Acetone (C ₃ H ₆ O)	All eleven stacks	NA
2-propanol (C ₃ H ₈ O)	All eleven stacks	NA

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Main components of VOCs	Relevant Stack	Proxy substance used in H1
Chlorobenzene (C ₆ H ₅ Cl)	A15/B30 Stack 29 only	Benzylchloride (C ₇ H ₇ Cl) and Benzene (C ₆ H ₆)

2.2.7 The stack parameters are outlined in Table 2-2.

Table 2-2: Stack Characteristics (per stack)

Stack	Efflux Velocity m.s ⁻¹	Actual volumetric flow (m ³ .h ⁻¹)	VOC concentration (mg.m ⁻³)
AO3/B3C Solvent	7.5	7641	32.24 as acetone 33.36 as 2-propanol
AO4/B3CAcidStack	5.475	8711.82	32.24 as acetone 33.36 as 2-propanol
AO5/B3C Flammable Stack	7.825	2788.83	32.24 as acetone 33.36 as 2-propanol
AO8/B30 Stack 2	6.9	1738.8	32.24 as acetone 33.36 as 2-propanol
A13/B30 Stack 21	9.7	3352.32	32.24 as acetone 33.36 as 2-propanol
Mod12 Soxhlet/B30 Mod 12	9.9	5132.2	32.24 as acetone 33.36 as 2-propanol
A24/A25/A26	14.6	18036	32.24 as acetone 33.36 as 2-propanol
A27/A28/A29	12.6	40824	32.24 as acetone 33.36 as 2-propanol
A37	0.75	764.1	32.24 as acetone 33.36 as 2-propanol
A38	0.5475	871.182	32.24 as acetone 33.36 as 2-propanol
A15/B30 Stack 29	14	2280	32.24 as acetone 33.36 as 2-propanol 2 as benzyl chloride 1 as benzene

2.2.8 The emissions data assumed for the assessment is based on the following AELs being applied for emissions to air:

- TVOC – 20 mg/Nm³ (as C)
- Benzene – 1 mg/Nm³

- Benzyl chloride (chlorobenzene proxy) – 2mg/Nm³

- 2.2.9 The proposed AEL for TVOC and Benzene are taken from the upper end of the BAT AELs as set out in UK formal draft BAT Conclusions¹.
- 2.2.10 This provides a BAT AELs of 20 mg/Nm³ as C for VOCs and of 1 mg/Nm³ for Benzene. Assuming a BAT AEL of 20 mg/Nm³ as C for VOCs, the following concentrations were assessed in the H1 screening (calculated by (20 x molecular weight of VOC) / (12.01 x number of carbon in VOC):
- Acetone – 32.24 mg/Nm³
 - 2-propanol – 33.36 mg/Nm³
- 2.2.11 No BAT AEL is provided for Chlorobenzene, an ELV of 2 mg/Nm³ has been used for the assessment.
- 2.2.12 Site monitoring data indicated that maximum measured concentrations will meet these emissions.
- 2.2.13 The stacks are all less than 3 m above the building and therefore the effective stack height is zero metres for all stacks.

2.3 Emissions Screening

- 2.3.1 Estimated emissions have been screened for significance against appropriate environmental standards for long-term and short-term exposure. Emissions standards are based on statutory air quality objectives where available, and upon human health protection Environmental Assessment Levels (EALs) as given in H1 guidance.
- 2.3.2 Emissions which are lower than 1% of the relevant emissions standard for long-term exposure and lower than 10% of the relevant limit for short-term exposure are screened out as insignificant. Figure 2-1 below shows the emissions screening results at Stage One.
- 2.3.3 The impact of long and short-term acetone have screened out as insignificant at stage one. For 2-propanol, benzylchloride and benzene a second stage of screening is required.
- 2.3.4 The second stage of screening assesses the predicted environmental concentration (PEC) against EALs. There is no local monitoring of or benzylchloride and there are no know local sources of these pollutants. Therefore, background concentrations are assumed to be zero. For benzene a background concentration of 0.43 µg/m³ has been used. This is taken from the 5 year average (2020-2024) as measured at Leamington Spa.
- 2.3.5 PECs which are lower than 70% of the relevant long-term emissions standard and lower than 20% of the relevant short-term standard minus 2 * the background concentration are screened out as insignificant. Those not screened out as insignificant are recommended for further detailed assessment. Figure 2-2 below shows the emissions screening results at Stage Two.
- 2.3.6 The stage two screening assessment indicates that all emissions screen out as insignificant. Therefore, no further assessment is required.
- 2.3.7 The assumptions made in the H1 will lead to predicted concentrations being higher than expected. The facility will operate as a batch process and therefore not all stacks will necessarily be operational at the same time and will not all necessarily emit the same

¹ Table 12 Formal Draft: BAT Conclusions for Common Waste Gas Management and Treatment in the Chemicals Sector

pollutant at the same time. The H1 assumes that all stacks will operate all year and will all emit total VOCs as e.g. acetone when in reality there is a chance that some stacks will emit a mixture of acetone and 2-propanol. Therefore concentrations are likely to be lower than those predicted in the H1 screening.

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Figure 2-1: Air Impact Screening Stage One

Test 1	Number	Substance	Long term EAL (ug/m3)	Long term PC (ug/m3)	%PC of EAL (long term)	>1% of EAL? (long term)	Short term EAL (ug/m3)	Short term PC (ug/m3)	%PC of EAL (short term)	>10% of EAL? (short term)
	1	Acetone	18100	119.8200934	0.66%	pass	362000	3157.42138	0.87%	pass
	2	2-propanol	9990	123.982578	1.24%	fail	125000	3267.108475	2.61%	pass
	3	Benzylchloride	5.2	0.187466667	3.61%	fail	158	4.94	3.13%	pass
	4	Benzene	5	0.093733333	1.87%	fail	30	1.4573	4.86%	pass

Figure 2-2: Air Impact Screening Stage Two

Test 2	Number	Substance	Long term EAL (ug/m3)	Long term PC (ug/m3)	Air Background conc (ug/m3)	%PC of headroom (long)	PEC Long term (ug/m3)	%PEC of EAL% (Long)	%PEC of EAL>70%?	Short term EAL	Short term PC (ug/m3)	%PC of the EAL-	%PC of headroom
	2	2-propanol	9990	123.982578	0	1%	123.98	1.24%	pass	125000	3267.108475	2.61%	pass
	3	Benzylchloride	5.2	0.187466667	0.43	4%	0.62	11.87%	pass	158	4.94	3.14%	pass
	4	Benzene	5	0.093733333	0.43	2%	0.52	10.47%	pass	30	1.4573	5.00%	pass

3 CONCLUSION

- 3.1.1 The H1 risk assessment software tool has been used to support a screening assessment of point source emissions to air from the installation located at Caswell, Towcester, Northamptonshire.
- 3.1.2 All stack emissions to air for relevant pollutants have been screened out as insignificant in H1, and do not require further assessment. However, during pre-application discussions the Environment Agency requested modelling be carried out for those substances which EALs were not defined. This additional assessment is provided in the Tetra Tech report *Air Quality Assessment Rev 0* dated 29th April 2026.