



I & H Brown Ltd

Odour Survey Report

Reliance Street Waste Management Site, Manchester

Report No. 444272-02(00)

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RSK GENERAL NOTES

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Date: 11th May 2022

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Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the work.

This work has been undertaken in accordance with the quality management system of RSK Environment Ltd.

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1 INTRODUCTION

1.1 Background

RSK Environment Limited (RSK) was commissioned by I & H Brown, on behalf of SUEZ Recycling and Recovery UK Ltd (SUEZ), to undertake odour sampling and analysis at the newly built Mechanical Treatment and Reception (MTR) building at Reliance Street Waste Management Site, Reliance Street, Manchester. The objectives of the odour sampling and analysis programme were to assess the effectiveness of the odour abatement system and to assess its capability to meet target levels of odour emission control, with the target of treated odour concentration of less than 1,000 ouE/m³.

The odour assessment was carried out in accordance with an agreed brief set out in the RSK proposal letter (RSK reference: T/44272-03(00)) and the method statement prepared by RSK (ref: RSK 444272 Reliance St, Manchester - Dust, Bioaerosol & Odour Sampling Method Statement), based on Appendix 10 of the Acceptance Test requirements provided by SUEZ.

1.2 The Site

The MTR building comprises a waste transfer station with a facility for loading for co-mingled containers, “pulpables” (waste paper and cardboard) and residual waste (MSW). A combination of mobile grab and front-end loader are used to transfer received waste into a shredder or the storage floor area. The shredder reduces the waste to smaller size. A set of mechanical belt conveyors then feed the shredded waste material under a band magnet to remove any ferrous materials for recycling.

The remaining residual waste is conveyed to three compactors which load waste into rail containers ready for transport off the site. The compacted waste is loaded into rail containers inside the building, and then when loaded they are detached from the compactor, sealed, and then taken from the building for outside storage prior to loading onto rail wagons.

All of the waste treatment processes are contained within the main building envelope. Air from the building is extracted at several locations by a ventilation system and treated by abatement plant which intended to abate dust, particulate matter and odour prior to discharge to atmosphere through a tall stack.

The testing reported here concerns the odour control performance of the abatement system.

1.3 Emissions Limits

It is understood that an odour impact assessment has previously been undertaken (prepared by Wood, Doc Ref. 40292 Final Report 18473i1) for the Reliance Street facility and it concluded that *'using an emission concentration of no more than 1000 ou_E/m³ exiting the stack and a stack height of 25m above ground level, the results show that there are no exceedances of the 1.5 ou_E/m³ threshold.'*

Therefore, the programme of odour sampling and analysis reported here was intended to assess if the abatement plant is capable of achieving the target of outlet odour concentration of less than 1,000 ou_E/m³.

2 METHODS

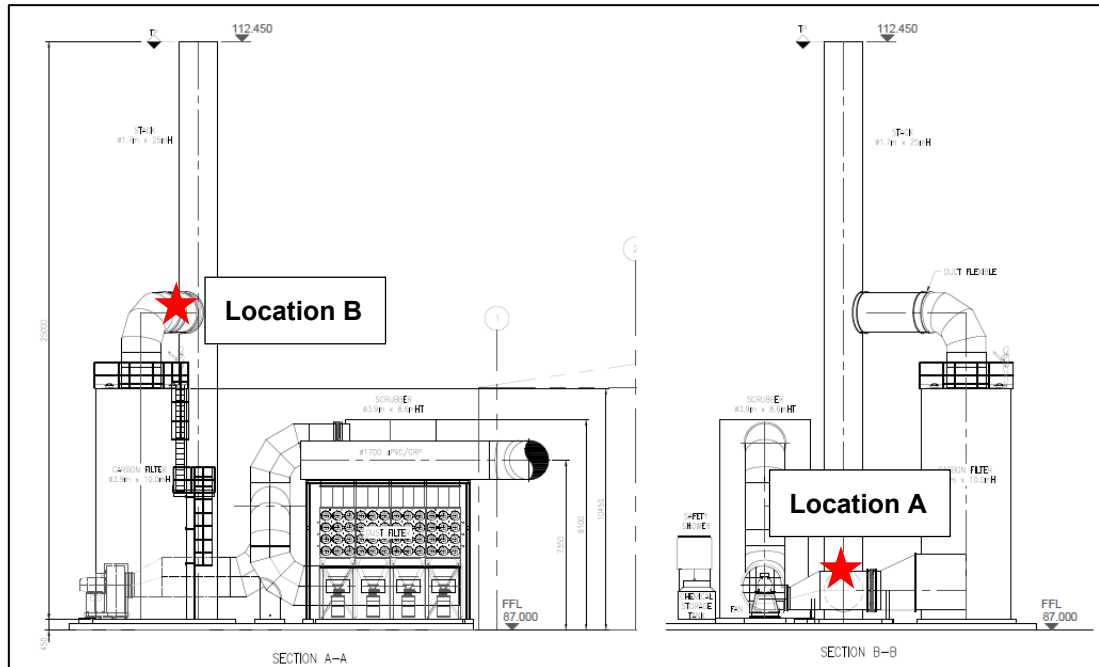
2.1 Sampling Strategy

Appendix 10 of the Acceptance Test requirements provided by SUEZ defines 'acceptance testing' with the specific requirements for odour survey, summarised below:

- Odour samples will be collected and analysed from the air streams into and out of the carbon filter installations.
- Three untreated air samples will be collected and analysed from the duct carrying untreated (process) air to the inlet of the carbon filter system. Three treated air samples will be collected and analysed from a sampling port on the dispersion stack which exhausts treated outlet air from the activated carbon filter. Sampling locations for the untreated air (location A) and treated air (location B) are shown in Figure 2.1 as below.
- Odour samples shall be collected once every Monday, Wednesday and Friday during a period of four Operational Weeks¹. The plant shall operate continuously throughout the period of testing when contract waste is stored in the Reliance Street MTR.
- Samples will be analysed using a forced choice dynamic olfactometer at the UKAS accredited Odour laboratory, in accordance with the procedures set out in British Standard BS EN 13725. Results will be presented as a measure of odour strength or concentration in the untreated and the treated air streams, expressed as European odour units per cubic metre (ou_E/m³).

¹ 15th April (Friday) and 18th April (Monday) were bank holidays, and the laboratory was closes on these two days. Therefore, survey on these two days have been rearranged to 14th April (Thursday) and 19th April (Tuesday), as agreed with I & H Brown.

Figure 2.1: Odour Sampling Locations (Location A - Untreated Air Samples and Location B – Treated Air Samples)



2.2 Sampling Methods

Odour sampling have been carried out using stainless steel and PTFE sampling tubes and fittings, with samples drawn into new and unused PET or 'Nalophan' sample bags. Inert sampling materials are used to minimise the risks of sample contamination. Figure 2.2 and 2.3 below shows the equipment set-up at the sampling locations.

The sample bags using the “lung” principle with samples collected by sample tube to a “barrel” containing the sample bags. The air space between the bag and the barrel was evacuated using a portable vacuum pump to fill the bags.

Sample collection data is summarised in Appendix 1.

Samples were be analysed using a forced choice dynamic olfactometer at the UKAS accredited Olfasense laboratory, Northwich, in accordance with the procedures set out in British Standard BS EN 13725. Results are be presented as a measure of odour strength or concentration in the untreated and the treated air streams, with concentrations expressed as European odour units per cubic metre (ou_E/m^3).

Figure 2.2: Odour Sampling Equipment Set-up – Location A



Figure 2.2: Odour Sampling Equipment Set-up – Location B



3 RESULTS AND CONCLUSIONS

The odour concentrations results (12 days survey, 72 samples in total) are presented in Table 3.1 and Figure 3.1 below. The “average” odour concentration for each daily set of three inlet and outlet samples is, by convention, expressed as geometric means because of the approximately logarithmic response of the human nose to odours

Untreated Air Odour Concentrations - Measured odour concentrations for the 36 individual untreated air samples ranged between 652 ou_E/m³ and 3,651 ou_E/m³.

Treated Air Samples Odour Concentrations - A number of the treated odour samples were too “weak” or insufficiently odorous to allow the odour laboratory to fully determine an odour concentration. The very low odour concentrations mean that for these samples not enough of the odour panel members were able generate the necessary number of individual threshold estimate (ITE) values required for a valid analysis result in accordance to EN13725. These samples can be assumed to have had odour concentration of less than the odour laboratory limit of detection, that is ≤ 30 ou_E/m³. For treated air samples that had odour concentrations high enough for determinations to be made, the treated air samples had odour concentrations ranged between 67 ou_E/m³ and 308 ou_E/m³.

The CEN 13725 or BS EN 13725 olfactometry standard sets out that the 95% confidence limits for a single sample that is expected to have a concentration of 1,000 ou_E/m³ are 453 ou_E/m³ to 2,209 ou_E/m³ where the minimum required laboratory precision is applied. Assuming that the laboratory is operating at the required level of precision, and that is a reasonable assumption for an accredited laboratory, all single treated air samples would have to be less than 2,209 ou_E/m³ to meet or exceed the 1,000 ou_E/m³ target. The results indicate that odour concentrations for treated air samples are in fact all well below the target of 1000 ou_E/m³ and even below the 95% confidence lower limit of 453 ou_E/m³.

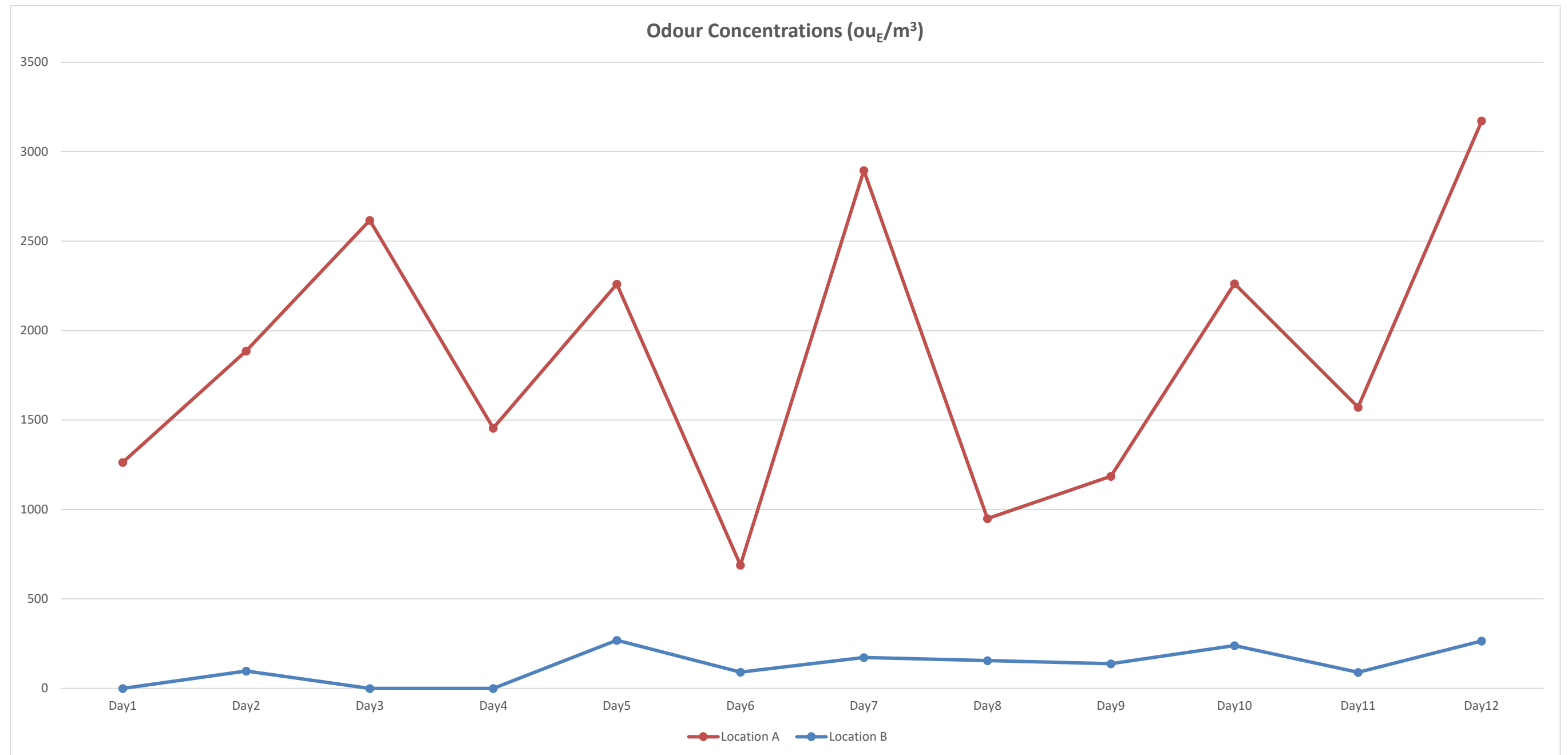
In most cases the inlet and outlet air odour samples were collected as concurrent pairs. It is possible to calculate the percentage reduction between inlet (untreated air) and outlet (treated air) odour concentrations. The results of these calculations are set out in Table 3.1 show that abatement plant achieved an averages reduction of 91% over the survey period (4 April 2022 – 29 April 2022).

An odour impact assessment undertaken by Wood (Doc Ref. 40292 Final Report 18473i1) states that *‘using an emission concentration of no more than 1000 ou_E/m³ exiting the stack and a stack height of 25m above ground level, the results show that there are no exceedances of the 1.5 ou_E/m³ threshold.’* The results of the testing reported here show that odour concentrations in treated air samples were well below the target of 1000 ou_E/m³ throughout the testing period. Therefore, it is considered that the abatement plant has been demonstrated to be capable of achieving the design objectives and satisfactorily controlling odour emissions to the target level.

Table 3.1: Odour Concentration Results

Survey Date	Sample Collection Times	Odour Concentrations (ouE/m³)								Percentage reductions in odour concentrations over abatement plant
		Location A (Untreated Air)				Location B (Treated Air)				
		Sample A1	Sample A2	Sample A3	Geometric Means	Sample B1	Sample B2	Sample B3	Geometric Means	
Day 1 (4 April 2022)	10:33 – 11:58	1565	1238	1040	1263	91	<LoD*	<LoD*	91	N/A
Day 2 (6 April 2022)	09:48 – 10:32	1947	1854	1859	1886	135	99	67	96	95%
Day 3 (8 April 2022)	10:46 – 11:44	3651	2,851	1,721	2,617	<LoD*	<LoD*	<LoD*	<LoD*	N/A
Day 4 (11 April 2022)	10:50 – 11:29	1,318	1,321	1,770	1,455	<LoD*	<LoD*	<LoD*	<LoD*	N/A
Day 5 (13 April 2022)	13:38 – 14:01	2,309	2,309	2,164	2,260	262	284	262	269	88%
Day 6 (14 April 2022)	10:42 -11:03	742	652	676	689	121	93	67	91	87%
Day 7 (19 April 2022)	10:48 – 11:16	3,193	2,851	2,666	2,895	158	214	152	173	94%
Day 8 (20 April 2022)	10:51 – 11:21	1,004	781	1,090	949	180	147	140	155	84%
Day 9 (22 April 2022)	10:53 – 11:25	1,337	1,026	1,215	1,186	116	145	154	137	88%
Day 10 (25 April 2022)	10:27 – 10:52	2,264	2,021	2,530	2,262	291	222	212	239	89%
Day 11 (27 April 2022)	10:35 – 11:17	2,306	1,281	1,315	1,572	120	87	69	90	94%
Day 12 (29 April 2022)	10:07 – 10:42	3,651	3,279	2,666	3,172	308	267	227	265	92%
Day 1-Day 12 Average	Geometric mean concentration for all untreated air samples				1684	Geometric mean concentration for all treated air samples with valid results			151	91%
*The sample was not sufficiently odorous for enough panel members to generate the necessary number of ITE results required for a valid analysis result in accordance to EN13725. These samples can be assumed to have had an odour concentration of ≤30 ouE/m³.										

Figure 3.1: Odour Concentration Results



APPENDIX A- LABORATORY CERTIFICATES OF ANALYSIS FOR ODOUR

CERTIFICATE

Certificate number RSKS22A_220405 22-04-05 15:11 A

Client	Organisation	RSK Environment Ltd
	Contact	Erin Zhang
	Address	Fourways House 57 Hilton Street Manchester M1 2EJ
	Telephone	0161 236 2757
Project	Project Code	RSKS22A_220405
	Lab technician	Cameron Rogers & Sam Boyle

Investigated item	Odour concentration in $\text{ou}_\text{E}/\text{m}^3$, determined by sensory measurement of odour concentration of an odour sample supplied in a sampling bag. The information included within this certificate relates to Olfasense UK's UKAS accredited odour concentration measurement procedures including pre-dilution. Sampling procedures and transit conditions are outside of the control of the laboratory and are not covered within the scope of Olfasense UK's odour concentration measurement accreditation.
Identification	The odour sample bags were labelled individually. The label showed the identification of the bag. This identification is referenced within the results.
Method	The odour concentration measurements were performed according to the European Standard EN13725:2003 'Air quality – Determination of odour concentration by dynamic olfactometry', and according to those parts as described in the internal procedure QD01: 'Procedure for olfactometry based on EN13725:2003'. The odour perception characteristic of the panel within the presentation series for the samples was analogous to that for the butanol calibration. The forced-choice method of presentation was used and at least two rounds are presented to determine the panel threshold. Sample bags are manufactured from PET, Nalophane and are not re-used.
Measuring range	The dilution range of the olfactometer is 1:45981 to 1:10.4. The lower limit of detection is 30 $\text{ou}_\text{E}/\text{m}^3$. If the concentration of the odour sample exceeded the higher dilution factors the odour sample may have been pre-diluted. If samples are pre-diluted in the laboratory this is specified under the column <i>Pre-dilution factor Z</i> in Table 1.
Environment	The measurements were performed in an air and odour conditioned room, at a temperature of $T \leq 25^\circ\text{C}$ and with a fluctuation of less than $\pm 3^\circ\text{C}$. The CO_2 concentration is $\leq 0.15\%$. The laboratory is stationary and permanent.
Dates and times	The measurement dates and times are specified together with the results in Table 1.
Results	The measurement results are presented in Table 1 of this certificate.
Uncertainty	The confidence limits for a value x for one measurement according to EN13725 (including up to 1 no. pre-dilution), with a cover factor $k = 2$ are: $x \cdot 2.45^{-1} \leq x \leq x \cdot 2.23$. The most recent interlaboratory comparison result is $A = 0.046$.
Traceability	The measurements have been performed using standards for which the traceability to (inter)national standards has been demonstrated. The assessors are individually selected to comply with fixed criteria and are monitored in time to keep within the limits set. The results from the assessors are traceable to primary standards (PSM's) of n-butanol in nitrogen.



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file
220405_RSKS22A_Cert_Northwich

CERTIFICATE

Certificate number RSKS22A_220405 22-04-05 15:11 A

Table 1 Measurement results

Analysis file	Sample ID	Client Reference	Analysis result [ouE.m ⁻³]	Pre-dilution factor Z	Odour concentration [ouE.m ⁻³]	Date and time of sampling	Date and time of analysis	Number of valid panel members	Number of valid ITE values	Remarks
220404AEZ	22040502	A1	1565	-	1565	04-04-2022 10:33	05-04-2022 09:20	4	8	
220404BEZ	22040503	A2	1238	-	1238	04-04-2022 11:15	05-04-2022 09:28	4	8	
220404CEZ	22040504	A3	1040	-	1040	04-04-2022 11:18	05-04-2022 09:37	4	8	Three series were presented.
220404DEZ	22040505	B1	91	-	91	04-04-2022 10:54	05-04-2022 10:00	4	8	
220404EEZ	22040506	B2	--	-	--	04-04-2022 11:15	05-04-2022 10:10	4	-	The sample was not sufficiently odorous for enough panel members to generate the necessary number of ITE results required for a valid analysis result in accordance to EN13725.
220404FEZ	22040507	B3	-	-	-	04-04-2022 11:58	05-04-2022 10:20	4	-	The sample was not sufficiently odorous for enough panel members to generate the necessary number of ITE results required for a valid analysis result in accordance to EN13725.

* Please note the client reference and date/time of sampling is data provided by the client.

Certificate approved by:

Amber Simm

Northwich, 6 April, 2022,



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220405_RSKS22A_Cert_Northwich

CERTIFICATE

Certificate number RSKS22A_220406 22-04-07 09:19 A

Client	Organisation	RSK Environment Ltd
	Contact	Erin Zhang
	Address	Fourways House 57 Hilton Street Manchester M1 2EJ
	Telephone	0161 236 2757
Project	Project Code	RSKS22A_220406
	Lab technician	Cameron Rogers & Sam Boyle
Investigated item	Odour concentration in $\text{ou}_\text{E}/\text{m}^3$, determined by sensory measurement of odour concentration of an odour sample supplied in a sampling bag. The information included within this certificate relates to Olfasense UK's UKAS accredited odour concentration measurement procedures including pre-dilution. Sampling procedures and transit conditions are outside of the control of the laboratory and are not covered within the scope of Olfasense UK's odour concentration measurement accreditation.	
Identification	The odour sample bags were labelled individually. The label showed the identification of the bag. This identification is referenced within the results.	
Method	The odour concentration measurements were performed according to the European Standard EN13725:2003 'Air quality – Determination of odour concentration by dynamic olfactometry', and according to those parts as described in the internal procedure QD01: 'Procedure for olfactometry based on EN13725:2003'. The odour perception characteristic of the panel within the presentation series for the samples was analogous to that for the butanol calibration. The forced-choice method of presentation was used and at least two rounds are presented to determine the panel threshold. Sample bags are manufactured from PET, Nalophane and are not re-used.	
Measuring range	The dilution range of the olfactometer is 1:45981 to 1:10.4. The lower limit of detection is 30 $\text{ou}_\text{E}/\text{m}^3$. If the concentration of the odour sample exceeded the higher dilution factors the odour sample may have been pre-diluted. If samples are pre-diluted in the laboratory this is specified under the column <i>Pre-dilution factor Z</i> in Table 1.	
Environment	The measurements were performed in an air and odour conditioned room, at a temperature of $T \leq 25^\circ\text{C}$ and with a fluctuation of less than $\pm 3^\circ\text{C}$. The CO_2 concentration is $\leq 0.15\%$. The laboratory is stationary and permanent.	
Dates and times	The measurement dates and times are specified together with the results in Table 1.	
Results	The measurement results are presented in Table 1 of this certificate.	
Uncertainty	The confidence limits for a value x for one measurement according to EN13725 (including up to 1 no. pre-dilution), with a cover factor $k = 2$ are: $x \cdot 2.45^{-1} \leq x \leq x \cdot 2.23$. The most recent interlaboratory comparison result is $A = 0.046$.	
Traceability	The measurements have been performed using standards for which the traceability to (inter)national standards has been demonstrated. The assessors are individually selected to comply with fixed criteria and are monitored in time to keep within the limits set. The results from the assessors are traceable to primary standards (PSM's) of n-butanol in nitrogen.	



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CERTIFICATE

Certificate number RSKS22A_220406 22-04-07 09:19 A

Table 1 Measurement results

Analysis file	Sample ID	Client Reference	Analysis result [ouE.m ⁻³]	Pre-dilution factor Z	Odour concentration [ouE.m ⁻³]	Date and time of sampling	Date and time of analysis	Number of valid panel members	Number of valid ITE values	Remarks
220406AEZ	22040618	A1	1947	-	1947	06-04-2022 09:48	06-04-2022 13:18	4	8	
220406BEZ	22040619	A2	1854	-	1854	06-04-2022 10:12	06-04-2022 13:24	4	8	
220406CEZ	22040620	A3	1859	-	1859	06-04-2022 10:30	06-04-2022 13:31	4	8	
220406DEZ	22040621	B1	135	-	135	06-04-2022 09:51	06-04-2022 13:40	4	8	
220406EEZ	22040622	B2	99	-	99	06-04-2022 10:14	06-04-2022 13:50	4	8	
220406FEZ	22040623	B3	67	-	67	06-04-2022 10:32	06-04-2022 13:57	4	8	

* Please note the client reference and date/time of sampling is data provided by the client.

Certificate approved by:

Jack Willmott

Bristol, 7 April, 2022,



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220406_RSKS22A_Cert_Northwich

CERTIFICATE

Certificate number RSKS22A_220408 22-04-11 08:29 A

Client	Organisation	RSK Environment Ltd
	Contact	Erin Zhang
	Address	Fourways House 57 Hilton Street Manchester M1 2EJ
	Telephone	0161 236 2757
Project	Project Code	RSKS22A_220408
	Lab technician	Cameron Rogers & Sam Boyle

Investigated item	Odour concentration in $\text{ou}_\text{E}/\text{m}^3$, determined by sensory measurement of odour concentration of an odour sample supplied in a sampling bag. The information included within this certificate relates to Olfasense UK's UKAS accredited odour concentration measurement procedures including pre-dilution. Sampling procedures and transit conditions are outside of the control of the laboratory and are not covered within the scope of Olfasense UK's odour concentration measurement accreditation.
Identification	The odour sample bags were labelled individually. The label showed the identification of the bag. This identification is referenced within the results.
Method	The odour concentration measurements were performed according to the European Standard EN13725:2003 'Air quality – Determination of odour concentration by dynamic olfactometry', and according to those parts as described in the internal procedure QD01: 'Procedure for olfactometry based on EN13725:2003'. The odour perception characteristic of the panel within the presentation series for the samples was analogous to that for the butanol calibration. The forced-choice method of presentation was used and at least two rounds are presented to determine the panel threshold. Sample bags are manufactured from PET, Nalophane and are not re-used.
Measuring range	The dilution range of the olfactometer is 1:45981 to 1:10.4. The lower limit of detection is 30 $\text{ou}_\text{E}/\text{m}^3$. If the concentration of the odour sample exceeded the higher dilution factors the odour sample may have been pre-diluted. If samples are pre-diluted in the laboratory this is specified under the column <i>Pre-dilution factor Z</i> in Table 1.
Environment	The measurements were performed in an air and odour conditioned room, at a temperature of $T \leq 25^\circ\text{C}$ and with a fluctuation of less than $\pm 3^\circ\text{C}$. The CO_2 concentration is $\leq 0.15\%$. The laboratory is stationary and permanent.
Dates and times	The measurement dates and times are specified together with the results in Table 1.
Results	The measurement results are presented in Table 1 of this certificate.
Uncertainty	The confidence limits for a value x for one measurement according to EN13725 (including up to 1 no. pre-dilution), with a cover factor $k = 2$ are: $x \cdot 2.45^{-1} \leq x \leq x \cdot 2.23$. The most recent interlaboratory comparison result is $A = 0.046$.
Traceability	The measurements have been performed using standards for which the traceability to (inter)national standards has been demonstrated. The assessors are individually selected to comply with fixed criteria and are monitored in time to keep within the limits set. The results from the assessors are traceable to primary standards (PSM's) of n-butanol in nitrogen.



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220408_RSKS22A_Cert_Northwich

CERTIFICATE

Certificate number RSKS22A_220408 22-04-11 08:29 A

Table 1 Measurement results

Analysis file	Sample ID	Client Reference	Analysis result [ouE.m ⁻³]	Pre-dilution factor Z	Odour concentration [ouE.m ⁻³]	Date and time of sampling	Date and time of analysis	Number of valid panel members	Number of valid ITE values	Remarks
220408AEZ	22040802	A1	3651	-	3651	08-04-2022 10:46	08-04-2022 14:07	4	8	
220408BEZ	22040803	A2	2851	-	2851	08-04-2022 11:21	08-04-2022 14:12	4	8	
220408CEZ	22040804	A3	1721	-	1721	08-04-2022 11:44	08-04-2022 14:18	4	8	
220408DEZ	22040805	B1	--	-	--	08-04-2022 10:47	08-04-2022 14:29	4	-	The sample was not sufficiently odorous for enough panel members to generate the necessary number of ITE results required for a valid analysis result in accordance to EN13725.
220408EEZ	22040806	B2	--	-	--	08-04-2022 11:21	08-04-2022 14:36	4	-	The sample was not sufficiently odorous for enough panel members to generate the necessary number of ITE results required for a valid analysis result in accordance to EN13725.
220408FEZ	22040807	B3	--	-	--	08-04-2022 11:44	08-04-2022 14:44	4	-	The sample was not sufficiently odorous for enough panel members to generate the necessary number of ITE results required for a valid analysis result in accordance to EN13725.

* Please note the client reference and date/time of sampling is data provided by the client.

Certificate approved by:

Amber Simm

Northwich, 11 April, 2022,



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file
220408_RSKS22A_Cert_Northwich

CERTIFICATE

Certificate number RSKS22A_220412 22-04-12 10:40 A

Client	Organisation	RSK Environment Ltd
	Contact	Erin Zhang
	Address	Fourways House 57 Hilton Street Manchester M1 2EJ
	Telephone	0161 236 2757
Project	Project Code	RSKS22A_220412
	Lab technician	Cameron Rogers

Investigated item	Odour concentration in $\text{ou}_\text{E}/\text{m}^3$, determined by sensory measurement of odour concentration of an odour sample supplied in a sampling bag. The information included within this certificate relates to Olfasense UK's UKAS accredited odour concentration measurement procedures including pre-dilution. Sampling procedures and transit conditions are outside of the control of the laboratory and are not covered within the scope of Olfasense UK's odour concentration measurement accreditation
Identification	The odour sample bags were labelled individually. The label showed the identification of the bag. This identification is referenced within the results.
Method	The odour concentration measurements were performed according to the European Standard EN13725:2003 'Air quality – Determination of odour concentration by dynamic olfactometry', and according to those parts as described in the internal procedure QD01: 'Procedure for olfactometry based on EN13725:2003'. The odour perception characteristic of the panel within the presentation series for the samples was analogous to that for the butanol calibration. The forced-choice method of presentation was used and at least two rounds are presented to determine the panel threshold. Sample bags are manufactured from PET, Nalophane and are not re-used.
Measuring range	The dilution range of the olfactometer is 1:45981 to 1:10.4. The lower limit of detection is 30 $\text{ou}_\text{E}/\text{m}^3$. If the concentration of the odour sample exceeded the higher dilution factors the odour sample may have been pre-diluted. If samples are pre-diluted in the laboratory this is specified under the column <i>Pre-dilution factor Z</i> in Table 1.
Environment	The measurements were performed in an air and odour conditioned room, at a temperature of $T \leq 25^\circ\text{C}$ and with a fluctuation of less than $\pm 3^\circ\text{C}$. The CO_2 concentration is $\leq 0.15\%$. The laboratory is stationary and permanent.
Dates and times	The measurement dates and times are specified together with the results in Table 1.
Results	The measurement results are presented in Table 1 of this certificate.
Uncertainty	The confidence limits for a value x for one measurement according to EN13725 (including up to 1 no. pre-dilution), with a cover factor $k = 2$ are: $x \cdot 2.45^{-1} \leq x \leq x \cdot 2.23$. The most recent interlaboratory comparison result is $A = 0.046$.
Traceability	The measurements have been performed using standards for which the traceability to (inter)national standards has been demonstrated. The assessors are individually selected to comply with fixed criteria and are monitored in time to keep within the limits set. The results from the assessors are traceable to primary standards (PSM's) of n-butanol in nitrogen.



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file
220412_RSKS22A_Cert_Northwich

CERTIFICATE

Certificate number RSKS22A_220412 22-04-12 10:40 A

Table 1 Measurement results

Analysis file	Sample ID	Client Reference	Analysis result [ouE.m ⁻³]	Pre-dilution factor Z	Odour concentration [ouE.m ⁻³]	Date and time of sampling	Date and time of analysis	Number of valid panel members	Number of valid ITE values	Remarks
220411AEZ	22041202	A1	1318	-	1318	11-04-2022 10:50	12-04-2022 09:08	5	8	
220411BEZ	22041203	A2	1321	-	1321	11-04-2022 11:04	12-04-2022 09:16	5	8	
220411CEZ	22041204	A3	1770	-	1770	11-04-2022 11:28	12-04-2022 09:26	5	8	
220411DEZ	22041205	B1	--	-	--	11-04-2022 10:52	12-04-2022 09:32	5	-	The sample was not sufficiently odorous for enough panel members to generate the necessary number of ITE results required for a valid analysis result in accordance to EN13725.
220411EEZ	22041206	B2	--	-	--	11-04-2022 11:15	12-04-2022 09:42	5	-	The sample was not sufficiently odorous for enough panel members to generate the necessary number of ITE results required for a valid analysis result in accordance to EN13725.
220411FEZ	22041207	B3	--	-	--	11-04-2022 11:29	12-04-2022 10:00	5	-	The sample was not sufficiently odorous for enough panel members to generate the necessary number of ITE results required for a valid analysis result in accordance to EN13725.

* Please note the client reference and date/time of sampling is data provided by the client

Certificate approved by:

Amber Simm

Northwich, 12 April, 2022,



2430



file
220412_RSKS22A_Cert_Northwich

CERTIFICATE

Certificate number RSKS22A_220414 22-04-19 11:10 SM

Client	Organisation	RSK Environment Ltd
	Contact	Erin Zhang
	Address	Fourways House 57 Hilton Street Manchester M1 2EJ
	Telephone	0161 236 2757
Project	Project Code	RSKS22A_220414
	Lab technician	Sam Boyle & Amber Simm

Investigated item	Odour concentration in $\text{ou}_\text{E}/\text{m}^3$, determined by sensory measurement of odour concentration of an odour sample supplied in a sampling bag. The information included within this certificate relates to Olfasense UK's UKAS accredited odour concentration measurement procedures including pre-dilution. Sampling procedures and transit conditions are outside of the control of the laboratory and are not covered within the scope of Olfasense UK's odour concentration measurement accreditation.
Identification	The odour sample bags were labelled individually. The label showed the identification of the bag. This identification is referenced within the results.
Method	The odour concentration measurements were performed according to the European Standard EN13725:2003 ' <i>Air quality – Determination of odour concentration by dynamic olfactometry</i> ', and according to those parts as described in the internal procedure QD01: ' <i>Procedure for olfactometry based on EN13725:2003</i> '. The odour perception characteristic of the panel within the presentation series for the samples was analogous to that for the butanol calibration. The forced-choice method of presentation was used and at least two rounds are presented to determine the panel threshold. Sample bags are manufactured from PET, Nalophane and are not re-used.
Measuring range	The dilution range of the olfactometer is 1:45981 to 1:10.4. The lower limit of detection is 30 $\text{ou}_\text{E}/\text{m}^3$. If the concentration of the odour sample exceeded the higher dilution factors the odour sample may have been pre-diluted. If samples are pre-diluted in the laboratory this is specified under the column <i>Pre-dilution factor Z</i> in Table 1.
Environment	The measurements were performed in an air and odour conditioned room, at a temperature of $T \leq 25^\circ\text{C}$ and with a fluctuation of less than $\pm 3^\circ\text{C}$. The CO_2 concentration is $\leq 0.15\%$. The laboratory is stationary and permanent.
Dates and times	The measurement dates and times are specified together with the results in Table 1.
Results	The measurement results are presented in Table 1 of this certificate.
Uncertainty	The confidence limits for a value x for one measurement according to EN13725 (including up to 1 no. pre-dilution), with a cover factor $k = 2$ are: $x \cdot 2.45^{-1} \leq x \leq x \cdot 2.23$. The most recent interlaboratory comparison result is $A = 0.046$.
Traceability	The measurements have been performed using standards for which the traceability to (inter)national standards has been demonstrated. The assessors are individually selected to comply with fixed criteria and are monitored in time to keep within the limits set. The results from the assessors are traceable to primary standards (PSM's) of n-butanol in nitrogen.



2430



file
220414_RSKS22A_Cert_Northwich

CERTIFICATE

Certificate number RSKS22A_220414 22-04-19 11:10 SM

Table 1 Measurement results

Analysis file	Sample ID	Client Reference	Analysis result [ouE.m ⁻³]	Pre-dilution factor Z	Odour concentration [ouE.m ⁻³]	Date and time of sampling	Date and time of analysis	Number of valid panel members	Number of valid ITE values	Remarks
220413AEZ	22041417	A1	2309	-	2309	13-04-2022 13:38	14-04-2022 12:13	4	8	
220413BEZ	22041418	A2	2309	-	2309	13-04-2022 13:52	14-04-2022 12:21	4	8	
220413CEZ	22041419	A3	2164	-	2164	13-04-2022 14:01	14-04-2022 15:11	4	8	
220413DEZ	22041420	B1	262	-	262	13-04-2022 13:38	14-04-2022 15:20	4	8	
220413EEZ	22041421	B2	284	-	284	13-04-2022 13:52	14-04-2022 15:26	4	8	Three series were presented.
220413FEZ	22041422	B3	262	-	262	13-04-2022 14:01	14-04-2022 15:37	4	8	

* Please note the client reference and date/time of sampling is data provided by the client

Certificate approved by:

Scott Martin

Northwich, 19 April 2022



2430



file
220414_RSKS22A_Cert_Northwich

CERTIFICATE

Certificate number RSKS22A_220414 22-04-19 11:17 SM

Client	Organisation	RSK Environment Ltd
	Contact	Erin Zhang
	Address	Fourways House 57 Hilton Street Manchester M1 2EJ
	Telephone	0161 236 2757
Project	Project Code	RSKS22A_220414
	Lab technician	Sam Boyle & Amber Simm

Investigated item	Odour concentration in $\text{ou}_\text{E}/\text{m}^3$, determined by sensory measurement of odour concentration of an odour sample supplied in a sampling bag. The information included within this certificate relates to Olfasense UK's UKAS accredited odour concentration measurement procedures including pre-dilution. Sampling procedures and transit conditions are outside of the control of the laboratory and are not covered within the scope of Olfasense UK's odour concentration measurement accreditation.
Identification	The odour sample bags were labelled individually. The label showed the identification of the bag. This identification is referenced within the results.
Method	The odour concentration measurements were performed according to the European Standard EN13725:2003 'Air quality – Determination of odour concentration by dynamic olfactometry', and according to those parts as described in the internal procedure QD01: 'Procedure for olfactometry based on EN13725:2003'. The odour perception characteristic of the panel within the presentation series for the samples was analogous to that for the butanol calibration. The forced-choice method of presentation was used and at least two rounds are presented to determine the panel threshold. Sample bags are manufactured from PET, Nalophane and are not re-used.
Measuring range	The dilution range of the olfactometer is 1:45981 to 1:10.4. The lower limit of detection is $30 \text{ ou}_\text{E}/\text{m}^3$. If the concentration of the odour sample exceeded the higher dilution factors the odour sample may have been pre-diluted. If samples are pre-diluted in the laboratory this is specified under the column <i>Pre-dilution factor Z</i> in Table 1.
Environment	The measurements were performed in an air and odour conditioned room, at a temperature of $T \leq 25^\circ\text{C}$ and with a fluctuation of less than $\pm 3^\circ\text{C}$. The CO_2 concentration is $\leq 0.15\%$. The laboratory is stationary and permanent.
Dates and times	The measurement dates and times are specified together with the results in Table 1.
Results	The measurement results are presented in Table 1 of this certificate.
Uncertainty	The confidence limits for a value x for one measurement according to EN13725 (including up to 1 no. pre-dilution), with a cover factor $k = 2$ are: $x \cdot 2.45^{-1} \leq x \leq x \cdot 2.23$. The most recent interlaboratory comparison result is $A = 0.046$.
Traceability	The measurements have been performed using standards for which the traceability to (inter)national standards has been demonstrated. The assessors are individually selected to comply with fixed criteria and are monitored in time to keep within the limits set. The results from the assessors are traceable to primary standards (PSM's) of n-butanol in nitrogen.



2430



file
220414_RSKS22A_Cert_Northwich_01

CERTIFICATE

Certificate number RSKS22A_220414 22-04-19 11:17 SM

Table 1 Measurement results

Analysis file	Sample ID	Client Reference	Analysis result [ouE.m ⁻³]	Pre-dilution factor Z	Odour concentration [ouE.m ⁻³]	Date and time of sampling	Date and time of analysis	Number of valid panel members	Number of valid ITE values	Remarks
220414AEZ	22041424	A1	742	-	742	14-04-2022 10:42	14-04-2022 15:58	4	8	
220414BEZ	22041425	A2	652	-	652	14-04-2022 10:53	14-04-2022 16:04	4	8	
220414CEZ	22041426	A3	676	-	676	14-04-2022 11:03	14-04-2022 16:11	4	8	
220414DEZ	22041427	B1	121	-	121	14-04-2022 10:42	14-04-2022 16:19	4	8	
220414EEZ	22041428	B2	93	-	93	14-04-2022 10:53	14-04-2022 16:26	4	8	
220414FEZ	22041429	B3	67	-	67	14-04-2022 11:03	14-04-2022 16:35	4	8	Three series were presented.

* Please note the client reference and date/time of sampling is data provided by the client

Certificate approved by:

Scott Martin

Northwich, 19 April 2022



2430



file
220414_RSKS22A_Cert_Northwich_01

CERTIFICATE

Certificate number RSKS22A_220419 22-04-20 10:27 SM

Client	Organisation	RSK Environment Ltd
	Contact	Erin Zhang
	Address	Fourways House 57 Hilton Street Manchester M1 2EJ
	Telephone	0161 236 2757
Project	Project Code	RSKS22A_220419
	Lab technician	Sam Boyle & Amber Simm

Investigated item	Odour concentration in $\text{ou}_\text{E}/\text{m}^3$, determined by sensory measurement of odour concentration of an odour sample supplied in a sampling bag. The information included within this certificate relates to Olfasense UK's UKAS accredited odour concentration measurement procedures including pre-dilution. Sampling procedures and transit conditions are outside of the control of the laboratory and are not covered within the scope of Olfasense UK's odour concentration measurement accreditation.
Identification	The odour sample bags were labelled individually. The label showed the identification of the bag. This identification is referenced within the results.
Method	The odour concentration measurements were performed according to the European Standard EN13725:2003 'Air quality – Determination of odour concentration by dynamic olfactometry', and according to those parts as described in the internal procedure QD01: 'Procedure for olfactometry based on EN13725:2003'. The odour perception characteristic of the panel within the presentation series for the samples was analogous to that for the butanol calibration. The forced-choice method of presentation was used and at least two rounds are presented to determine the panel threshold. Sample bags are manufactured from PET, Nalophane and are not re-used.
Measuring range	The dilution range of the olfactometer is 1:45981 to 1:10.4. The lower limit of detection is 30 $\text{ou}_\text{E}/\text{m}^3$. If the concentration of the odour sample exceeded the higher dilution factors the odour sample may have been pre-diluted. If samples are pre-diluted in the laboratory this is specified under the column <i>Pre-dilution factor Z</i> in Table 1.
Environment	The measurements were performed in an air and odour conditioned room, at a temperature of $T \leq 25^\circ\text{C}$ and with a fluctuation of less than $\pm 3^\circ\text{C}$. The CO_2 concentration is $\leq 0.15\%$. The laboratory is stationary and permanent.
Dates and times	The measurement dates and times are specified together with the results in Table 1.
Results	The measurement results are presented in Table 1 of this certificate.
Uncertainty	The confidence limits for a value x for one measurement according to EN13725 (including up to 1 no. pre-dilution), with a cover factor $k = 2$ are: $x \cdot 2.45^{-1} \leq x \leq x \cdot 2.23$. The most recent interlaboratory comparison result is $A = 0.046$.
Traceability	The measurements have been performed using standards for which the traceability to (inter)national standards has been demonstrated. The assessors are individually selected to comply with fixed criteria and are monitored in time to keep within the limits set. The results from the assessors are traceable to primary standards (PSM's) of n-butanol in nitrogen.



2430



file
220419_RSKS22A_Cert_Northwich

CERTIFICATE

Certificate number RSKS22A_220419 22-04-20 10:27 SM

Table 1 Measurement results

Analysis file	Sample ID	Client Reference	Analysis result [ouE.m ⁻³]	Pre-dilution factor Z	Odour concentration [ouE.m ⁻³]	Date and time of sampling	Date and time of analysis	Number of valid panel members	Number of valid ITE values	Remarks
220419AEZ	22041902	A1	3193	-	3193	19-04-2022 10:48	19-04-2022 14:31	4	8	Three series were presented.
220419BEZ	22041903	A2	2851	-	2851	19-04-2022 10:59	19-04-2022 14:37	4	8	
220419CEZ	22041904	A3	2666	-	2666	19-04-2022 11:12	19-04-2022 14:43	4	8	
220419DEZ	22041905	B1	158	-	158	19-04-2022 10:48	19-04-2022 15:46	4	8	
220419EEZ	22041906	B2	214	-	214	19-04-2022 10:59	19-04-2022 15:17	4	8	
220419FEZ	22041907	B3	152	-	152	19-04-2022 11:16	19-04-2022 15:38	4	8	

* Please note the client reference and date/time of sampling is data provided by the client

Certificate approved by:

Scott Martin

Northwich, 20 April 2022



2430



file
220419_RSKS22A_Cert_Northwich

CERTIFICATE

Certificate number RSKS22A_220420 22-04-21 09:09 A

Client	Organisation	RSK Environment Ltd
	Contact	Erin Zhang
	Address	Fourways House 57 Hilton Street Manchester M1 2EJ
	Telephone	0161 236 2757
Project	Project Code	RSKS22A_220420
	Lab technician	Amber Simm

Investigated item	Odour concentration in ou_E/m^3, determined by sensory measurement of odour concentration of an odour sample supplied in a sampling bag. The information included within this certificate relates to Olfasense UK's UKAS accredited odour concentration measurement procedures including pre-dilution. Sampling procedures and transit conditions are outside of the control of the laboratory and are not covered within the scope of Olfasense UK's odour concentration measurement accreditation.
Identification	The odour sample bags were labelled individually. The label showed the identification of the bag. This identification is referenced within the results.
Method	The odour concentration measurements were performed according to the European Standard EN13725:2003 'Air quality – Determination of odour concentration by dynamic olfactometry', and according to those parts as described in the internal procedure QD01: 'Procedure for olfactometry based on EN13725:2003'. The odour perception characteristic of the panel within the presentation series for the samples was analogous to that for the butanol calibration. The forced-choice method of presentation was used and at least two rounds are presented to determine the panel threshold. Sample bags are manufactured from PET, Nalophane and are not re-used.
Measuring range	The dilution range of the olfactometer is 1:45981 to 1:10.4. The lower limit of detection is 30 ou_E/m^3 . If the concentration of the odour sample exceeded the higher dilution factors the odour sample may have been pre-diluted. If samples are pre-diluted in the laboratory this is specified under the column <i>Pre-dilution factor Z</i> in Table 1.
Environment	The measurements were performed in an air and odour conditioned room, at a temperature of $T \leq 25^\circ\text{C}$ and with a fluctuation of less than $\pm 3^\circ\text{C}$. The CO_2 concentration is $\leq 0.15\%$. The laboratory is stationary and permanent.
Dates and times	The measurement dates and times are specified together with the results in Table 1.
Results	The measurement results are presented in Table 1 of this certificate.
Uncertainty	The confidence limits for a value x for one measurement according to EN13725 (including up to 1 no. pre-dilution), with a cover factor $k = 2$ are: $x \cdot 2.45^{-1} \leq x \leq x \cdot 2.23$. The most recent interlaboratory comparison result is $A = 0.046$.
Traceability	The measurements have been performed using standards for which the traceability to (inter)national standards has been demonstrated. The assessors are individually selected to comply with fixed criteria and are monitored in time to keep within the limits set. The results from the assessors are traceable to primary standards (PSM's) of n-butanol in nitrogen.



2430



file
220420_RSKS22A_Cert_Northwich

CERTIFICATE

Certificate number RSKS22A_220420 22-04-21 09:09 A

Table 1 Measurement results

Analysis file	Sample ID	Client Reference	Analysis result [ouE.m ⁻³]	Pre-dilution factor Z	Odour concentration [ouE.m ⁻³]	Date and time of sampling	Date and time of analysis	Number of valid panel members	Number of valid ITE values	Remarks
220420AEZ	22042002	A1	1004	-	1004	20-04-2022 10:51	20-04-2022 15:30	5	8	
220420BEZ	22042003	A2	781	-	781	20-04-2022 11:05	20-04-2022 15:11	5	10	
220420CEZ	22042004	A3	1090	-	1090	20-04-2022 11:21	20-04-2022 15:46	5	8	
220420DEZ	22042005	B1	180	-	180	20-04-2022 10:52	20-04-2022 16:06	5	8	
220420EEZ	22042006	B2	147	-	147	20-04-2022 11:05	20-04-2022 16:12	5	8	
220420FEZ	22042007	B3	140	-	140	20-04-2022 11:21	20-04-2022 16:18	5	8	

* Please note the client reference and date/time of sampling is data provided by the client

Certificate approved by:

Amber Simm

Northwich, 21 April, 2022,



2430



file
220420_RSKS22A_Cert_Northwich

CERTIFICATE

Certificate number RSKS22A_220422 22-04-25 08:17 SM

Client	Organisation	RSK Environment Ltd
	Contact	Erin Zhang
	Address	Fourways House 57 Hilton Street Manchester M1 2EJ
	Telephone	0161 236 2757
Project	Project Code	RSKS22A_220422
	Lab technician	Amber Simm

Investigated item	Odour concentration in $\text{ou}_\text{E}/\text{m}^3$, determined by sensory measurement of odour concentration of an odour sample supplied in a sampling bag. The information included within this certificate relates to Olfasense UK's UKAS accredited odour concentration measurement procedures including pre-dilution. Sampling procedures and transit conditions are outside of the control of the laboratory and are not covered within the scope of Olfasense UK's odour concentration measurement accreditation.
Identification	The odour sample bags were labelled individually. The label showed the identification of the bag. This identification is referenced within the results.
Method	The odour concentration measurements were performed according to the European Standard EN13725:2003 'Air quality – Determination of odour concentration by dynamic olfactometry', and according to those parts as described in the internal procedure QD01: 'Procedure for olfactometry based on EN13725:2003'. The odour perception characteristic of the panel within the presentation series for the samples was analogous to that for the butanol calibration. The forced-choice method of presentation was used and at least two rounds are presented to determine the panel threshold. Sample bags are manufactured from PET, Nalophane and are not re-used.
Measuring range	The dilution range of the olfactometer is 1:45981 to 1:10.4. The lower limit of detection is $30 \text{ ou}_\text{E}/\text{m}^3$. If the concentration of the odour sample exceeded the higher dilution factors the odour sample may have been pre-diluted. If samples are pre-diluted in the laboratory this is specified under the column <i>Pre-dilution factor Z</i> in Table 1.
Environment	The measurements were performed in an air and odour conditioned room, at a temperature of $T \leq 25^\circ\text{C}$ and with a fluctuation of less than $\pm 3^\circ\text{C}$. The CO_2 concentration is $\leq 0.15\%$. The laboratory is stationary and permanent.
Dates and times	The measurement dates and times are specified together with the results in Table 1.
Results	The measurement results are presented in Table 1 of this certificate.
Uncertainty	The confidence limits for a value x for one measurement according to EN13725 (including up to 1 no. pre-dilution), with a cover factor $k = 2$ are: $x \cdot 2.45^{-1} \leq x \leq x \cdot 2.23$. The most recent interlaboratory comparison result is $A = 0.046$.
Traceability	The measurements have been performed using standards for which the traceability to (inter)national standards has been demonstrated. The assessors are individually selected to comply with fixed criteria and are monitored in time to keep within the limits set. The results from the assessors are traceable to primary standards (PSM's) of n-butanol in nitrogen.



2430



file
220422_RSKS22A_Cert_Northwich

CERTIFICATE

Certificate number RSKS22A_220422 22-04-25 08:17 SM

Table 1 Measurement results

Analysis file	Sample ID	Client Reference	Analysis result [ouE.m ⁻³]	Pre-dilution factor Z	Odour concentration [ouE.m ⁻³]	Date and time of sampling	Date and time of analysis	Number of valid panel members	Number of valid ITE values	Remarks
220422AEZ	22042207	A1	1337	-	1337	22-04-2022 10:53	22-04-2022 15:07	5	8	Three series were presented.
220422BEZ	22042208	A2	1026	-	1026	22-04-2022 11:08	22-04-2022 15:14	5	8	
220422CEZ	22042209	A3	1215	-	1215	22-04-2022 11:25	22-04-2022 15:26	5	8	
220422DEZ	22042210	B1	116	-	116	22-04-2022 10:53	22-04-2022 15:35	5	10	
220422EEZ	22042211	B2	145	-	145	22-04-2022 11:08	22-04-2022 15:53	5	8	
220422FEZ	22042212	B3	154	-	154	22-04-2022 11:25	22-04-2022 16:00	5	10	

* Please note the client reference and date/time of sampling is data provided by the client

Certificate approved by:

Scott Martin

Northwich, 25 April 2022



2430



file
220422_RSKS22A_Cert_Northwich

CERTIFICATE

Certificate number RSKS22A_220426 22-04-27 12:01 SM

Client	Organisation	RSK Environment Ltd
	Contact	Erin Zhang
	Address	Fourways House 57 Hilton Street Manchester M1 2EJ
	Telephone	0161 236 2757
Project	Project Code	RSKS22A_220426
	Lab technician	Amber Simm

Investigated item	Odour concentration in $\text{ou}_\text{E}/\text{m}^3$, determined by sensory measurement of odour concentration of an odour sample supplied in a sampling bag. The information included within this certificate relates to Olfasense UK's UKAS accredited odour concentration measurement procedures including pre-dilution. Sampling procedures and transit conditions are outside of the control of the laboratory and are not covered within the scope of Olfasense UK's odour concentration measurement accreditation.
Identification	The odour sample bags were labelled individually. The label showed the identification of the bag. This identification is referenced within the results.
Method	The odour concentration measurements were performed according to the European Standard EN13725:2003 'Air quality – Determination of odour concentration by dynamic olfactometry', and according to those parts as described in the internal procedure QD01: 'Procedure for olfactometry based on EN13725:2003'. The odour perception characteristic of the panel within the presentation series for the samples was analogous to that for the butanol calibration. The forced-choice method of presentation was used and at least two rounds are presented to determine the panel threshold. Sample bags are manufactured from PET, Nalophane and are not re-used.
Measuring range	The dilution range of the olfactometer is 1:45981 to 1:10.4. The lower limit of detection is 30 $\text{ou}_\text{E}/\text{m}^3$. If the concentration of the odour sample exceeded the higher dilution factors the odour sample may have been pre-diluted. If samples are pre-diluted in the laboratory this is specified under the column <i>Pre-dilution factor Z</i> in Table 1.
Environment	The measurements were performed in an air and odour conditioned room, at a temperature of $T \leq 25^\circ\text{C}$ and with a fluctuation of less than $\pm 3^\circ\text{C}$. The CO_2 concentration is $\leq 0.15\%$. The laboratory is stationary and permanent.
Dates and times	The measurement dates and times are specified together with the results in Table 1.
Results	The measurement results are presented in Table 1 of this certificate.
Uncertainty	The confidence limits for a value x for one measurement according to EN13725 (including up to 1 no. pre-dilution), with a cover factor $k = 2$ are: $x \cdot 2.45^{-1} \leq x \leq x \cdot 2.23$. The most recent interlaboratory comparison result is $A = 0.046$.
Traceability	The measurements have been performed using standards for which the traceability to (inter)national standards has been demonstrated. The assessors are individually selected to comply with fixed criteria and are monitored in time to keep within the limits set. The results from the assessors are traceable to primary standards (PSM's) of n-butanol in nitrogen.



2430



file
220426_RSKS22A_Cert_Northwich

CERTIFICATE

Certificate number RSKS22A_220426 22-04-27 12:01 SM

Table 1 Measurement results

Analysis file	Sample ID	Client Reference	Analysis result [ouE.m ⁻³]	Pre-dilution factor Z	Odour concentration [ouE.m ⁻³]	Date and time of sampling	Date and time of analysis	Number of valid panel members	Number of valid ITE values	Remarks
220425AEZ	22042602	A1	2264	-	2264	25-04-2022 10:27	26-04-2022 09:30	5	10	
220425BEZ	22042603	A2	2021	-	2021	25-04-2022 10:41	26-04-2022 09:37	5	10	
220425CEZ	22042604	A3	2530	-	2530	25-04-2022 10:52	26-04-2022 10:01	5	10	
220425DEZ	22042605	B1	291	-	291	25-04-2022 10:27	26-04-2022 10:08	5	10	
220425EEZ	22042606	B2	222	-	222	25-04-2022 10:41	26-04-2022 10:15	5	10	
220425FEZ	22042607	B3	212	-	212	25-04-2022 10:52	26-04-2022 10:22	5	10	

* Please note the client reference and date/time of sampling is data provided by the client

Certificate approved by:

Scott Martin

Northwich, 27 April 2022



2430



file
220426_RSKS22A_Cert_Northwich

CERTIFICATE

Certificate number RSKS22A_220427 22-04-28 13:01 SM

Client	Organisation	RSK Environment Ltd
	Contact	Erin Zhang
	Address	Fourways House 57 Hilton Street Manchester M1 2EJ
	Telephone	0161 236 2757
Project	Project Code	RSKS22A_220427
	Lab technician	Sam Boyle

Investigated item	Odour concentration in $\text{ou}_\text{E}/\text{m}^3$, determined by sensory measurement of odour concentration of an odour sample supplied in a sampling bag. The information included within this certificate relates to Olfasense UK's UKAS accredited odour concentration measurement procedures including pre-dilution. Sampling procedures and transit conditions are outside of the control of the laboratory and are not covered within the scope of Olfasense UK's odour concentration measurement accreditation.
Identification	The odour sample bags were labelled individually. The label showed the identification of the bag. This identification is referenced within the results.
Method	The odour concentration measurements were performed according to the European Standard EN13725:2003 'Air quality – Determination of odour concentration by dynamic olfactometry', and according to those parts as described in the internal procedure QD01: 'Procedure for olfactometry based on EN13725:2003'. The odour perception characteristic of the panel within the presentation series for the samples was analogous to that for the butanol calibration. The forced-choice method of presentation was used and at least two rounds are presented to determine the panel threshold. Sample bags are manufactured from PET, Nalophane and are not re-used.
Measuring range	The dilution range of the olfactometer is 1:45981 to 1:10.4. The lower limit of detection is 30 $\text{ou}_\text{E}/\text{m}^3$. If the concentration of the odour sample exceeded the higher dilution factors the odour sample may have been pre-diluted. If samples are pre-diluted in the laboratory this is specified under the column <i>Pre-dilution factor Z</i> in Table 1.
Environment	The measurements were performed in an air and odour conditioned room, at a temperature of $T \leq 25^\circ\text{C}$ and with a fluctuation of less than $\pm 3^\circ\text{C}$. The CO_2 concentration is $\leq 0.15\%$. The laboratory is stationary and permanent.
Dates and times	The measurement dates and times are specified together with the results in Table 1.
Results	The measurement results are presented in Table 1 of this certificate.
Uncertainty	The confidence limits for a value x for one measurement according to EN13725 (including up to 1 no. pre-dilution), with a cover factor $k = 2$ are: $x \cdot 2.45^{-1} \leq x \leq x \cdot 2.23$. The most recent interlaboratory comparison result is $A = 0.046$.
Traceability	The measurements have been performed using standards for which the traceability to (inter)national standards has been demonstrated. The assessors are individually selected to comply with fixed criteria and are monitored in time to keep within the limits set. The results from the assessors are traceable to primary standards (PSM's) of n-butanol in nitrogen.



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220427_RSKS22A_Cert_Northwich

CERTIFICATE

Certificate number RSKS22A_220427 22-04-28 13:01 SM

Table 1 Measurement results

Analysis file	Sample ID	Client Reference	Analysis result [ouE.m ⁻³]	Pre-dilution factor Z	Odour concentration [ouE.m ⁻³]	Date and time of sampling	Date and time of analysis	Number of valid panel members	Number of valid ITE values	Remarks
220427AEZ	22042702	A1	2306	-	2306	27-04-2022 10:35	27-04-2022 15:36	4	8	
220427BEZ	22042703	A2	1281	-	1281	27-04-2022 10:54	27-04-2022 16:06	4	8	
220427CEZ	22042704	A3	1315	-	1315	27-04-2022 11:17	27-04-2022 16:15	4	8	
220427DEZ	22042705	B1	120	-	120	27-04-2022 10:35	27-04-2022 16:22	4	8	
220427EEZ	22042706	B2	87	-	87	27-04-2022 10:54	27-04-2022 16:31	4	8	
220427FEZ	22042707	B3	69	-	69	27-04-2022 11:17	27-04-2022 16:38	4	8	

* Please note the client reference and date/time of sampling is data provided by the client

Certificate approved by:

Scott Martin

Northwich, 29 April 2022



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file
220427_RSKS22A_Cert_Northwich

CERTIFICATE

Certificate number RSKS22A_220429 22-05-03 13:12 SM

Client	Organisation	RSK Environment Ltd
	Contact	Erin Zhang
	Address	Fourways House 57 Hilton Street Manchester M1 2EJ
	Telephone	0161 236 2757
Project	Project Code	RSKS22A_220429
	Lab technician	Amber Simm

Investigated item	Odour concentration in $\text{ou}_\text{E}/\text{m}^3$, determined by sensory measurement of odour concentration of an odour sample supplied in a sampling bag. The information included within this certificate relates to Olfasense UK's UKAS accredited odour concentration measurement procedures including pre-dilution. Sampling procedures and transit conditions are outside of the control of the laboratory and are not covered within the scope of Olfasense UK's odour concentration measurement accreditation.
Identification	The odour sample bags were labelled individually. The label showed the identification of the bag. This identification is referenced within the results.
Method	The odour concentration measurements were performed according to the European Standard EN13725:2003 'Air quality – Determination of odour concentration by dynamic olfactometry', and according to those parts as described in the internal procedure QD01: 'Procedure for olfactometry based on EN13725:2003'. The odour perception characteristic of the panel within the presentation series for the samples was analogous to that for the butanol calibration. The forced-choice method of presentation was used and at least two rounds are presented to determine the panel threshold. Sample bags are manufactured from PET, Nalophane and are not re-used.
Measuring range	The dilution range of the olfactometer is 1:45981 to 1:10.4. The lower limit of detection is 30 $\text{ou}_\text{E}/\text{m}^3$. If the concentration of the odour sample exceeded the higher dilution factors the odour sample may have been pre-diluted. If samples are pre-diluted in the laboratory this is specified under the column <i>Pre-dilution factor Z</i> in Table 1.
Environment	The measurements were performed in an air and odour conditioned room, at a temperature of $T \leq 25^\circ\text{C}$ and with a fluctuation of less than $\pm 3^\circ\text{C}$. The CO_2 concentration is $\leq 0.15\%$. The laboratory is stationary and permanent.
Dates and times	The measurement dates and times are specified together with the results in Table 1.
Results	The measurement results are presented in Table 1 of this certificate.
Uncertainty	The confidence limits for a value x for one measurement according to EN13725 (including up to 1 no. pre-dilution), with a cover factor $k = 2$ are: $x \cdot 2.45^{-1} \leq x \leq x \cdot 2.23$. The most recent interlaboratory comparison result is $A = 0.046$.
Traceability	The measurements have been performed using standards for which the traceability to (inter)national standards has been demonstrated. The assessors are individually selected to comply with fixed criteria and are monitored in time to keep within the limits set. The results from the assessors are traceable to primary standards (PSM's) of n-butanol in nitrogen.



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220429_RSKS22A_Cert_Northwich

CERTIFICATE

Certificate number RSKS22A_220429 22-05-03 13:12 SM

Table 1 Measurement results

Analysis file	Sample ID	Client Reference	Analysis result [ouE.m ⁻³]	Pre-dilution factor Z	Odour concentration [ouE.m ⁻³]	Date and time of sampling	Date and time of analysis	Number of valid panel members	Number of valid ITE values	Remarks
220429AEZ	22042912	A1	3651	-	3651	29-04-2022 10:07	29-04-2022 12:56	5	10	Three series were presented
220429BEZ	22042913	A2	3279	-	3279	29-04-2022 10:23	29-04-2022 13:01	5	10	
220429CEZ	22042914	A3	2666	-	2666	29-04-2022 10:42	29-04-2022 13:07	5	8	
220429DEZ	22042915	B1	308	-	308	29-04-2022 10:07	29-04-2022 13:39	5	10	
220429EEZ	22042916	B2	267	-	267	29-04-2022 10:23	29-04-2022 13:44	5	10	
220429FEZ	22042917	B3	227	-	227	29-04-2022 10:42	29-04-2022 13:50	5	8	

* Please note the client reference and date/time of sampling is data provided by the client

Certificate approved by:

Scott Martin

Bristol, 5 May 2022



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220429_RSKS22A_Cert_Northwich