AIR EMISSIONS RISK ASSESSMENT

DESCYCLE
metals made new

WILTON CENTRE - PIONEER GROUP,
WILTON, LAZENBY, REDCAR,
TS10 4RF

ECL Ref: DESC.01.01/H1
November 2025
Version: Issue 1

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LIST OF APPENDICES

LIST OF ACRONYMS / TERMS USED

AQS	**Air Quality Standard**
EA	**Environment Agency**
ECL	**Environmental Compliance Limited**
ELV	**Emission Limit Value**
EP	**Environmental Permit**
LOD	**Limit of Detection**
PC	**Process Contribution**
PMR	**Periodic Monitoring Result**
The Installation	**DEScycle's Solvent-based Metal Recovery Installation, Wilton Centre, Redcar, TS10 4RF**
VOC	**Volatile Organic Compounds**

1. INTRODUCTION

1.1. Overview

1.1.1. Environmental Compliance Limited ("ECL") have been commissioned by DEScycle to prepare an air emissions risk assessment (hereafter to referred to as a "H1") to form part of the Environmental Permit ("EP") application for DEScycle's solvent-based metal recovery installation located at the Wilton Centre, Redcar, TS10 4RF ("the Installation").

1.1.2. The H1 considered emissions of volatile organic compounds ("VOCs") and various acids from proposed emission points A1 (sources: Slurry Vessel, DES 1 Vessel, DES 2 Vessel) and A2 (source: Dryer). The assessment has been carried out using the approach detailed in the EA's online guidance[1].

1.1.3. The assessment has been undertaken for two scenarios, which make use of the periodic monitoring results ("PMRs") obtained from the August 2025 ECL Emissions Monitoring Survey report (a copy of which may be found in Appendix I) to use the actual flow rates and calculate flow rates and a further scenario using the likely flow rates. Both scenarios consider proposed emission limit values ("ELVs").

1.1.4. It should be noted that, as the ECL stack emissions report (see Appendix I) was undertaken for a bench scale DEScycle plant, the measured volumetric flow rate values are unlikely to be reflective of the final plant. However as the plant is still in the detailed design stage confirmed volumetric flow rates can not be confirmed.

1.1.5. The four distinct scenarios are as follows:

- A: emissions at proposed ELVs with measured volumetric flow rates; and
- B: emissions at proposed ELVs with anticipated volumetric flow rates.

1.1.6. It is assumed the data for the reaction vessel surveyed in July 2025 for the August 2025 ECL Emissions Monitoring Survey report are applicable to the proposed A1 and A2 emission point at the Installation. However, it should be noted that the A2 emission point will be extracting a far greater volume of air.

1.1.7. To identify and quantify the VOC and acid constituents within the gas stream, top 20 speciated VOC testing was undertaken alongside an aldehyde suite and an acids suite. It should also be noted that the emissions testing was undertaken on unabated emissions. It is envisaged that an improvement condition will be contained within the Installation's permit which will require the operator to propose a monitoring programme to characterise and assess the Installation's point source emissions to air once fully operational. Emissions points A1 and A2 will then be fitted with appropriate abatement if and as required.

1.1.8. Of the substances identified by the laboratory testing, those with declared air quality standards ("AQSs") were assessed. Please note that the term AQS in the context of this assessment has been used to refer to the various standards set for the applicable pollutants for the protection of human or environmental health.

[1] Air emissions risk assessment for your environmental permit: https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit

1.1.9. The calculation sheets for the H1 screening assessment are presented within Appendices II and III for scenarios A and B, respectively.

1.2. Summary of Results

1.2.1. It can be seen from the results presented in the H1 calculation sheets (see Appendix II – and III) that, with the exception of hydrogen chloride, the process contributions ("PCs") screen out at the first stage of screening (i.e., the long-term PCs are less than 1% of the long-term AQS and / or the short-term PCs are less than 10% of the short-term AQS).

1.2.2. Where further screening was required for long-term HCl (for the standards set for human health), following stage two screening, the impacts could all be considered not significant. Consequently, no further assessment is required.

1.3. Recommendations

1.3.1. An operational improvement condition is proposed for the Installation to carry out stack emissions testing, following the commissioning works. This will allow an updated H1 assessment to be produced to help ensure the findings of the risk assessment remain valid.

APPENDIX I
EMISSIONS MONITORING SURVEY REPORT – AUGUST 2025

2499

EMISSIONS MONITORING SURVEY

(On Behalf of DEScycle Limited)

At:

Leicester University.
Materials Laboratory
University Road
Leicester
LE1 7RH

Permit Number	**: …**
Variation Number	**: …**
Installation	**: Reaction Vessel**
Visit Details	**: Investigative Emissions – July 2025**
Job Number	**: P6125**
Report Number	**: R001**
Report Issue Date	**: 20th August 2025**
Survey Dates	**: 1st July 2025**

Prepared by:

Environmental Compliance Limited
Unit G1
Main Avenue
Treforest Industrial Estate
Pontypridd
CF37 5BF.
Tel: 01443 801215

Report Issue:		**FINAL**	
Report Prepared by:		**Report Reviewed & Approved by:** MCERTS Level Two Technical Endorsements TE1, TE2, TE3 & TE4	
Name:	Scott Hackett	***Name:***	Andy Barnes
		MCERTS No:	MM 03 235
		Signature:	
Date:	15th August 2025	***Date:***	20th August 2025

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MCERTS requirements mean that comparison of results with emissions limit values is not permitted within this report.

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PART 1 - EXECUTIVE SUMMARY

1 Monitoring Objectives

Environmental Compliance Ltd (ECL) was commissioned by DEScycle Limited to undertake an emission monitoring survey at **Leicester University**. This report presents the findings of the study.

The monitoring at this installation was carried out in accordance with our quotation reference **PC/P6125/Q002,** for investigate monitoring of emissions to air. The substances requested for monitoring at each emissions point are listed below:

Substances to be monitored	Emission Point Identification **Reaction Vessel (Materials Laboratory)**
Velocity / Flowrate	● U
Total VOCs (Tube Sampling)	●
Top 20 Speciated VOCs (Tube Sampling)	● U
Aldehydes Suite (Tube Sampling)	● U
Acids Suite (Tube Sampling)	●

● Denotes the substances to be monitored.

U **Denotes UKAS accreditation is held for monitoring that substance, but does not mean that it has been claimed which will depend on whether the testing could be completed in accordance with the Standard Reference Method.**

Special Requirements:
"*Testing to be carried out during three phases of the reaction cycle*"

1.1 Monitoring Results

Emission Point Reference	Substance to be Monitored	Emission Limit Value	Periodic Monitoring Result	Units	Mass Emission **NOTE UNITS**	Expanded Uncertainty (as % of)			Reference Conditions 273 K,101.3 kPa	Date of Sampling	Start and End Times	Monitoring Method Reference	Accreditation Claimed for Test Result	Tick if non-conforming test (see Section 2)	Operating Status
						ELV	Span Value	Measured Value							
Reaction Vessel – (Materials Laboratory)	Volumetric Flowrate	…	0.00302	m³/sec	…	…	…	5	Stack Conditions	01/07/25	10:15 – 10:32	BS EN 16911-1:2013 & MID	NU	✓	Reaction Phase 1
	Volumetric Flowrate	…	0.00274	m³/sec	…	…	…	6	& Wet Gas	01/07/25	10:15 – 10:32	BS EN 16911-1:2013 & MID	NU	✓	
	Volumetric Flowrate	…	0.00438	m³/sec	…	…	…	4	Stack Conditions	01/07/25	11:45 – 11:56	BS EN 16911-1:2013 & MID	NU	✓	Reaction Phase 2
	Volumetric Flowrate	…	0.00394	m³/sec	…	…	…	5	& Wet Gas	01/07/25	11:45 – 11:56	BS EN 16911-1:2013 & MID	NU	✓	
	Volumetric Flowrate	…	0.00478	m³/sec	…	…	…	8	Stack Conditions	01/07/25	14:22 – 14:37	BS EN 16911-1:2013 & MID	UKAS / MCERTS		Reaction Phase 3
	Volumetric Flowrate	…	0.00428	m³/sec	…	…	…	9	& Wet Gas	01/07/25	14:22 – 14:37	BS EN 16911-1:2013 & MID	UKAS / MCERTS		

The mass emission values presented in the tables below are calculated using these flowrates above, measured in the ductwork at the **start** of each reaction phase.

DEScycle at Leicester University
Permit No : ...
Variation No : ...
Report Ref : P6125 : R001

Installation Name : Reaction Vessel
Visit Details : Investigative Emissions – July 2025
Survey Dates : 1st July 2025
Report Issue Date : 20th August 2025

Emission Point Reference	Substance to be Monitored	Emission Limit Value	Periodic Monitoring Result	Units	Mass Emission (mg/hr)	Expanded Uncertainty (as % of)			Reference Conditions 273 K,101.3 kPa	Date of Sampling	Start and End Times	Monitoring Method Reference	Accreditation Claimed for Test Result	Tick if non-conforming test (see Section 2)	Operating Status
						ELV	Span Value	Measured Value							
Reaction Vessel – (Materials Laboratory)	Formaldehyde $	...	0.098	mg/m³	0.97	...	...	50	& Wet Gas	01/07/25	10:20 – 10:50	CEN/TS 13649:2014	UKAS / MCERTS	✓	Reaction Phase 1
	Butyraldehyde $	...	< 0.049	mg/m³	< 0.48	...	...	> 100	& Wet Gas	01/07/25	10:20 – 10:50	CEN/TS 13649:2014	UKAS / MCERTS	✓	
	Acetaldehyde $	...	0.049	mg/m³	0.48	...	...	60	& Wet Gas	01/07/25	10:20 – 10:50	CEN/TS 13649:2014	UKAS / MCERTS	✓	
	Propionaldehyde $	...	< 0.049	mg/m³	< 0.48	...	...	> 100	& Wet Gas	01/07/25	10:20 – 10:50	CEN/TS 13649:2014	UKAS / MCERTS	✓	
	Benzaldehyde $	...	< 0.049	mg/m³	< 0.48	...	...	> 100	& Wet Gas	01/07/25	10:20 – 10:50	CEN/TS 13649:2014	UKAS / MCERTS	✓	
	Valeraldehyde $	...	< 0.049	mg/m³	< 0.48	...	...	> 100	& Wet Gas	01/07/25	10:20 – 10:50	CEN/TS 13649:2014	UKAS / MCERTS	✓	
	Hexanal $	...	< 0.049	mg/m³	< 0.48	...	...	> 100	& Wet Gas	01/07/25	10:20 – 10:50	CEN/TS 13649:2014	UKAS / MCERTS	✓	
	Heptanal $	...	< 0.024	mg/m³	< 0.24	...	...	> 100	& Wet Gas	01/07/25	10:20 – 10:50	CEN/TS 13649:2014	NU	✓	
	Total Aldehydes $	...	< 0.42	mg/m³	< 4.14	...	...	30	& Wet Gas	01/07/25	10:20 – 10:50	CEN/TS 13649:2014	NU	✓	
	Total VOC $	...	< 2.46	mg/m³	< 24.27	...	...	> 100	& Wet Gas	01/07/25	10:20 – 10:50	CEN/TS 13649:2014	NU	✓	
	Speciated VOC $	...	< 1.23*	mg/m³	< 12.13	...	...	> 100	& Wet Gas	01/07/25	10:20 – 10:50	CEN/TS 13649:2014	NU	✓	
	Hydrofluoric Acid $	...	< 1.23	mg/m³	< 12.13	...	...	> 100	& Wet Gas	01/07/25	10:20 – 10:50	Based on CEN/TS 13649:2014	NA	✓	
	Hydrochloric Acid $	...	< 0.25	mg/m³	< 2.47	...	...	> 100	& Wet Gas	01/07/25	10:20 – 10:50	Based on CEN/TS 13649:2014	NA	✓	
	Nitric Acid $	...	< 0.49	mg/m³	<4.83	...	...	> 100	& Wet Gas	01/07/25	10:20 – 10:50	Based on CEN/TS 13649:2014	NA	✓	
	Phosphoric Acid $	...	< 1.47	mg/m³	< 14.50	...	...	> 100	& Wet Gas	01/07/25	10:20 – 10:50	Based on CEN/TS 13649:2014	NA	✓	
	Sulphuric Acid $	...	< 0.49	mg/m³	< 4.83	...	...	> 100	& Wet Gas	01/07/25	10:20 – 10:50	Based on CEN/TS 13649:2014	NA	✓	
	Hydrogen Bromide $	...	< 0.49	mg/m³	<4.83	...	...	> 100	& Wet Gas	01/07/25	10:20 – 10:50	Based on CEN/TS 13649:2014	NA	✓	
	Total Acids $	...	< 4.41	mg/m³	< 43.50	...	...	48	& Wet Gas	01/07/25	10:20 – 10:50	Based on CEN/TS 13649:2014	NA	✓	

***** There were zero peaks found on the GC-MS Scan above the 1.23 mg/m³ limit of detection

DEScycle at Leicester University
Permit No : ...
Variation No : ...
Report Ref : P6125 : R001

Installation Name : Reaction Vessel
Visit Details : Investigative Emissions – July 2025
Survey Dates : 1st July 2025
Report Issue Date : 20th August 2025

Emission Point Reference	Substance to be Monitored	Emission Limit Value	Periodic Monitoring Result	Units	Mass Emission (mg/hr)	Expanded Uncertainty (as % of)			Reference Conditions 273 K,101.3 kPa	Date of Sampling	Start and End Times	Monitoring Method Reference	Accreditation Claimed for Test Result	Tick if non-conforming test (see Section 2)	Operating Status
						ELV	Span Value	Measured Value							
Reaction Vessel – (Materials Laboratory)	Formaldehyde $	...	0.098	mg/m³	0.97	...	...	50	& Wet Gas	01/07/25	11:00 – 11:30	CEN/TS 13649:2014	UKAS / MCERTS	✓	Reaction Phase 1
	Butyraldehyde $	...	< 0.049	mg/m³	< 0.48	...	...	> 100	& Wet Gas	01/07/25	11:00 – 11:30	CEN/TS 13649:2014	UKAS / MCERTS	✓	
	Acetaldehyde $	...	< 0.025	mg/m³	< 0.25	...	...	> 100	& Wet Gas	01/07/25	11:00 – 11:30	CEN/TS 13649:2014	UKAS / MCERTS	✓	
	Propionaldehyde $	...	< 0.049	mg/m³	< 0.48	...	...	> 100	& Wet Gas	01/07/25	11:00 – 11:30	CEN/TS 13649:2014	UKAS / MCERTS	✓	
	Benzaldehyde $	...	< 0.049	mg/m³	< 0.48	...	...	> 100	& Wet Gas	01/07/25	11:00 – 11:30	CEN/TS 13649:2014	UKAS / MCERTS	✓	
	Valeraldehyde $	...	< 0.049	mg/m³	< 0.48	...	...	> 100	& Wet Gas	01/07/25	11:00 – 11:30	CEN/TS 13649:2014	UKAS / MCERTS	✓	
	Hexanal $	...	< 0.049	mg/m³	< 0.48	...	...	> 100	& Wet Gas	01/07/25	11:00 – 11:30	CEN/TS 13649:2014	UKAS / MCERTS	✓	
	Heptanal $	...	< 0.049	mg/m³	< 0.48	...	...	> 100	& Wet Gas	01/07/25	11:00 – 11:30	CEN/TS 13649:2014	NU	✓	
	Total Aldehydes $	...	< 0.42	mg/m³	< 4.14	...	...	32	& Wet Gas	01/07/25	11:00 – 11:30	CEN/TS 13649:2014	NU	✓	
	Total VOC $	...	< 2.47	mg/m³	< 24.36	...	...	> 100	& Wet Gas	01/07/25	11:00 – 11:30	CEN/TS 13649:2014	NU	✓	
	Speciated VOC $	...	< 1.23*	mg/m³	< 12.13	...	...	> 100	& Wet Gas	01/07/25	11:00 – 11:30	CEN/TS 13649:2014	NU	✓	
	Hydrofluoric Acid $	...	< 1.25	mg/m³	< 12.33	...	...	> 100	& Wet Gas	01/07/25	11:05 – 11:35	Based on CEN/TS 13649:2014	NA	✓	
	Hydrochloric Acid $	...	< 0.25	mg/m³	< 2.47	...	...	> 100	& Wet Gas	01/07/25	11:05 – 11:35	Based on CEN/TS 13649:2014	NA	✓	
	Nitric Acid $	...	< 0.50	mg/m³	< 4.93	...	...	> 100	& Wet Gas	01/07/25	11:05 – 11:35	Based on CEN/TS 13649:2014	NA	✓	
	Phosphoric Acid $	...	< 1.50	mg/m³	< 14.80	...	...	> 100	& Wet Gas	01/07/25	11:05 – 11:35	Based on CEN/TS 13649:2014	NA	✓	
	Sulphuric Acid $	...	< 0.50	mg/m³	< 4.93	...	...	> 100	& Wet Gas	01/07/25	11:05 – 11:35	Based on CEN/TS 13649:2014	NA	✓	
	Hydrogen Bromide $	...	< 0.50	mg/m³	< 4.93	...	...	> 100	& Wet Gas	01/07/25	11:05 – 11:35	Based on CEN/TS 13649:2014	NA	✓	
	Total Acids $	...	< 4.51	mg/m³	< 44.49	...	...	48	& Wet Gas	01/07/25	11:05 – 11:35	Based on CEN/TS 13649:2014	NA	✓	

***** There were zero peaks found on the GC-MS Scan above the 1.23 mg/m³ limit of detection

DEScycle at Leicester University
Permit No : ...
Variation No : ...
Report Ref : P6125 : R001

Installation Name : Reaction Vessel
Visit Details : Investigative Emissions – July 2025
Survey Dates : 1st July 2025
Report Issue Date : 20th August 2025

Emission Point Reference	Substance to be Monitored	Emission Limit Value	Periodic Monitoring Result	Units	Mass Emission (mg/hr)	Expanded Uncertainty (as % of)			Reference Conditions 273 K,101.3 kPa	Date of Sampling	Start and End Times	Monitoring Method Reference	Accreditation Claimed for Test Result	Tick if non-conforming test (see Section 2)	Operating Status
						ELV	Span Value	Measured Value							
Reaction Vessel – (Materials Laboratory)	Formaldehyde $	...	0.074	mg/m³	1.05	...	...	50	& Wet Gas	01/07/25	11:40 – 12:10	CEN/TS 13649:2014	UKAS / MCERTS	✓	Reaction Phase 2
	Butyraldehyde $	...	< 0.050	mg/m³	< 0.71	...	...	> 100	& Wet Gas	01/07/25	11:40 – 12:10	CEN/TS 13649:2014	UKAS / MCERTS	✓	
	Acetaldehyde $	...	0.69	mg/m³	9.79	...	...	11	& Wet Gas	01/07/25	11:40 – 12:10	CEN/TS 13649:2014	UKAS / MCERTS	✓	
	Propionaldehyde $	...	< 0.050	mg/m³	< 0.71	...	...	> 100	& Wet Gas	01/07/25	11:40 – 12:10	CEN/TS 13649:2014	UKAS / MCERTS	✓	
	Benzaldehyde $	...	< 0.050	mg/m³	< 0.71	...	...	> 100	& Wet Gas	01/07/25	11:40 – 12:10	CEN/TS 13649:2014	UKAS / MCERTS	✓	
	Valeraldehyde $	...	< 0.050	mg/m³	< 0.71	...	...	> 100	& Wet Gas	01/07/25	11:40 – 12:10	CEN/TS 13649:2014	UKAS / MCERTS	✓	
	Hexanal $	...	< 0.050	mg/m³	< 0.71	...	...	> 100	& Wet Gas	01/07/25	11:40 – 12:10	CEN/TS 13649:2014	UKAS / MCERTS	✓	
	Heptanal $	...	< 0.050	mg/m³	< 0.71	...	...	> 100	& Wet Gas	01/07/25	11:40 – 12:10	CEN/TS 13649:2014	NU	✓	
	Total Aldehydes $	...	< 1.07	mg/m³	< 15.18	...	...	14	& Wet Gas	01/07/25	11:40 – 12:10	CEN/TS 13649:2014	NU	✓	
	Total VOC $	...	< 2.49	mg/m³	< 35.32	...	...	> 100	& Wet Gas	01/07/25	11:40 – 12:10	CEN/TS 13649:2014	NU	✓	
	Speciated VOC $	...	< 1.25*	mg/m³	< 17.73	...	...	> 100	& Wet Gas	01/07/25	11:40 – 12:10	CEN/TS 13649:2014	NU	✓	
	Hydrofluoric Acid $	...	< 1.23	mg/m³	< 17.45	...	...	> 100	& Wet Gas	01/07/25	11:40 – 12:10	Based on CEN/TS 13649:2014	NA	✓	
	Hydrochloric Acid $	...	< 0.25	mg/m³	< 3.55	...	...	> 100	& Wet Gas	01/07/25	11:40 – 12:10	Based on CEN/TS 13649:2014	NA	✓	
	Nitric Acid $	...	< 0.49	mg/m³	< 6.95	...	...	> 100	& Wet Gas	01/07/25	11:40 – 12:10	Based on CEN/TS 13649:2014	NA	✓	
	Phosphoric Acid $	...	< 1.48	mg/m³	< 20.99	...	...	> 100	& Wet Gas	01/07/25	11:40 – 12:10	Based on CEN/TS 13649:2014	NA	✓	
	Sulphuric Acid $	...	< 0.49	mg/m³	< 6.95	...	...	> 100	& Wet Gas	01/07/25	11:40 – 12:10	Based on CEN/TS 13649:2014	NA	✓	
	Hydrogen Bromide $	...	< 0.49	mg/m³	< 6.95	...	...	> 100	& Wet Gas	01/07/25	11:40 – 12:10	Based on CEN/TS 13649:2014	NA	✓	
	Total Acids $	...	< 4.44	mg/m³	< 62.98	...	...	48	& Wet Gas	01/07/25	11:40 – 12:10	Based on CEN/TS 13649:2014	NA	✓	

***** There were zero peaks found on the GC-MS Scan above the 1.25 mg/m³ limit of detection

DEScycle at Leicester University
Permit No : ...
Variation No : ...
Report Ref : P6125 : R001

Installation Name : Reaction Vessel
Visit Details : Investigative Emissions – July 2025
Survey Dates : 1st July 2025
Report Issue Date : 20th August 2025

Emission Point Reference	Substance to be Monitored	Emission Limit Value	Periodic Monitoring Result	Units	Mass Emission (mg/hr)	Expanded Uncertainty (as % of)			Reference Conditions 273 K,101.3 kPa	Date of Sampling	Start and End Times	Monitoring Method Reference	Accreditation Claimed for Test Result	Tick if non-conforming test (see Section 2)	Operating Status
						ELV	Span Value	Measured Value							
Reaction Vessel – (Materials Laboratory)	Formaldehyde $	...	0.075	mg/m³	1.06	...	...	50	& Wet Gas	01/07/25	13:02 – 13:32	CEN/TS 13649:2014	UKAS / MCERTS	✓	Reaction Phase 2
	Butyraldehyde $	...	< 0.050	mg/m³	< 0.71	...	...	> 100	& Wet Gas	01/07/25	13:02 – 13:32	CEN/TS 13649:2014	UKAS / MCERTS	✓	
	Acetaldehyde $	...	0.17	mg/m³	2.41	...	...	30	& Wet Gas	01/07/25	13:02 – 13:32	CEN/TS 13649:2014	UKAS / MCERTS	✓	
	Propionaldehyde $	...	< 0.050	mg/m³	< 0.71	...	...	> 100	& Wet Gas	01/07/25	13:02 – 13:32	CEN/TS 13649:2014	UKAS / MCERTS	✓	
	Benzaldehyde $	...	< 0.050	mg/m³	< 0.71	...	...	> 100	& Wet Gas	01/07/25	13:02 – 13:32	CEN/TS 13649:2014	UKAS / MCERTS	✓	
	Valeraldehyde $	...	< 0.050	mg/m³	< 0.71	...	...	> 100	& Wet Gas	01/07/25	13:02 – 13:32	CEN/TS 13649:2014	UKAS / MCERTS	✓	
	Hexanal $	...	< 0.050	mg/m³	< 0.71	...	...	> 100	& Wet Gas	01/07/25	13:02 – 13:32	CEN/TS 13649:2014	UKAS / MCERTS	✓	
	Heptanal $	...	< 0.050	mg/m³	< 0.71	...	...	> 100	& Wet Gas	01/07/25	13:02 – 13:32	CEN/TS 13649:2014	NU	✓	
	Total Aldehydes $	...	<0.55	mg/m³	< 7.80	...	...	25	& Wet Gas	01/07/25	13:02 – 13:32	CEN/TS 13649:2014	NU	✓	
	Total VOC $	...	< 2.50	mg/m³	< 35.46	...	...	> 100	& Wet Gas	01/07/25	13:02 – 13:32	CEN/TS 13649:2014	NU	✓	
	Speciated VOC $	...	< 1.25*	mg/m³	< 17.73	...	...	> 100	& Wet Gas	01/07/25	13:02 – 13:32	CEN/TS 13649:2014	NU	✓	
	Hydrofluoric Acid $	...	< 1.24	mg/m³	< 17.59	...	...	> 100	& Wet Gas	01/07/25	13:02 – 13:32	Based on CEN/TS 13649:2014	NA	✓	
	Hydrochloric Acid $	...	< 0.25	mg/m³	< 3.55	...	...	> 100	& Wet Gas	01/07/25	13:02 – 13:32	Based on CEN/TS 13649:2014	NA	✓	
	Nitric Acid $	...	< 0.50	mg/m³	< 7.09	...	...	> 100	& Wet Gas	01/07/25	13:02 – 13:32	Based on CEN/TS 13649:2014	NA	✓	
	Phosphoric Acid $	...	< 1.49	mg/m³	< 21.13	...	...	> 100	& Wet Gas	01/07/25	13:02 – 13:32	Based on CEN/TS 13649:2014	NA	✓	
	Sulphuric Acid $	...	< 0.50	mg/m³	< 7.09	...	...	> 100	& Wet Gas	01/07/25	13:02 – 13:32	Based on CEN/TS 13649:2014	NA	✓	
	Hydrogen Bromide $	...	< 0.50	mg/m³	< 7.09	...	...	> 100	& Wet Gas	01/07/25	13:02 – 13:32	Based on CEN/TS 13649:2014	NA	✓	
	Total Acids $	...	< 4.47	mg/m³	< 63.40	...	...	48	& Wet Gas	01/07/25	13:02 – 13:32	Based on CEN/TS 13649:2014	NA	✓	

***** There were zero peaks found on the GC-MS Scan above the 1.25 mg/m³ limit of detection

DEScycle at Leicester University
Permit No : ...
Variation No : ...
Report Ref : P6125 : R001

Installation Name : Reaction Vessel
Visit Details : Investigative Emissions – July 2025
Survey Dates : 1st July 2025
Report Issue Date : 20th August 2025

Emission Point Reference	Substance to be Monitored	Emission Limit Value	Periodic Monitoring Result	Units	Mass Emission (mg/hr)	Expanded Uncertainty (as % of)			Reference Conditions 273 K,101.3 kPa	Date of Sampling	Start and End Times	Monitoring Method Reference	Accreditation Claimed for Test Result	Tick if non-conforming test (see Section 2)	Operating Status
						ELV	Span Value	Measured Value							
Reaction Vessel – (Materials Laboratory)	Formaldehyde $	...	0.15	mg/m³	2.31	...	...	30	& Wet Gas	01/07/25	14:15 – 14:45	CEN/TS 13649:2014	UKAS / MCERTS	✓	Reaction Phase 3
	Butyraldehyde $	...	< 0.050	mg/m³	< 0.77	...	...	> 100	& Wet Gas	01/07/25	14:15 – 14:45	CEN/TS 13649:2014	UKAS / MCERTS	✓	
	Acetaldehyde $	...	1.07	mg/m³	16.49	...	...	11	& Wet Gas	01/07/25	14:15 – 14:45	CEN/TS 13649:2014	UKAS / MCERTS	✓	
	Propionaldehyde $	...	< 0.050	mg/m³	< 0.77	...	...	> 100	& Wet Gas	01/07/25	14:15 – 14:45	CEN/TS 13649:2014	UKAS / MCERTS	✓	
	Benzaldehyde $	...	< 0.050	mg/m³	< 0.77	...	...	> 100	& Wet Gas	01/07/25	14:15 – 14:45	CEN/TS 13649:2014	UKAS / MCERTS	✓	
	Valeraldehyde $	...	< 0.050	mg/m³	< 0.77	...	...	> 100	& Wet Gas	01/07/25	14:15 – 14:45	CEN/TS 13649:2014	UKAS / MCERTS	✓	
	Hexanal $	...	< 0.050	mg/m³	< 0.77	...	...	> 100	& Wet Gas	01/07/25	14:15 – 14:45	CEN/TS 13649:2014	UKAS / MCERTS	✓	
	Heptanal $	...	< 0.050	mg/m³	< 0.77	...	...	> 100	& Wet Gas	01/07/25	14:15 – 14:45	CEN/TS 13649:2014	NU	✓	
	Total Aldehydes $	...	< 1.52	mg/m³	< 23.42	...	...	12	& Wet Gas	01/07/25	14:15 – 14:45	CEN/TS 13649:2014	NU	✓	
	Total VOC $	...	14.02	mg/m³	216.02	...	...	11	& Wet Gas	01/07/25	14:15 – 14:45	CEN/TS 13649:2014	NU	✓	
	Speciated VOC (Acetone) $	...	12.74*	mg/m³	196.30	...	...	11	& Wet Gas	01/07/25	14:15 – 14:45	CEN/TS 13649:2014	NU	✓	
	Hydrofluoric Acid $	...	< 1.24	mg/m³	< 19.11	...	...	> 100	& Wet Gas	01/07/25	14:15 – 14:45	Based on CEN/TS 13649:2014	NA	✓	
	Hydrochloric Acid $	...	< 0.25	mg/m³	< 3.85	...	...	> 100	& Wet Gas	01/07/25	14:15 – 14:45	Based on CEN/TS 13649:2014	NA	✓	
	Nitric Acid $	...	< 0.50	mg/m³	< 7.70	...	...	> 100	& Wet Gas	01/07/25	14:15 – 14:45	Based on CEN/TS 13649:2014	NA	✓	
	Phosphoric Acid $	...	< 1.49	mg/m³	< 22.96	...	...	> 100	& Wet Gas	01/07/25	14:15 – 14:45	Based on CEN/TS 13649:2014	NA	✓	
	Sulphuric Acid $	...	< 0.50	mg/m³	< 7.70	...	...	> 100	& Wet Gas	01/07/25	14:15 – 14:45	Based on CEN/TS 13649:2014	NA	✓	
	Hydrogen Bromide $	...	< 0.50	mg/m³	< 7.70	...	...	> 100	& Wet Gas	01/07/25	14:15 – 14:45	Based on CEN/TS 13649:2014	NA	✓	
	Total Acids $	...	< 4.47	mg/m³	< 68.87	...	...	48	& Wet Gas	01/07/25	14:15 – 14:45	Based on CEN/TS 13649:2014	NA	✓	

***** Acetone was the only peak found on the GC-MS Scan above the 1.25 mg/m³ limit of detection

DEScycle at Leicester University **Installation Name : Reaction Vessel**
Permit No : ... **Visit Details : Investigative Emissions – July 2025**
Variation No : ... **Survey Dates : 1st July 2025**
Report Ref : P6125 : R001 **Report Issue Date : 20th August 2025**

Emission Point Reference	Substance to be Monitored	Emission Limit Value	Periodic Monitoring Result	Units	Mass Emission (mg/hr)	Expanded Uncertainty (as % of)			Reference Conditions 273 K,101.3 kPa	Date of Sampling	Start and End Times	Monitoring Method Reference	Accreditation Claimed for Test Result	Tick if non-conforming test (see Section 2)	Operating Status
						ELV	Span Value	Measured Value							
Reaction Vessel – (Materials Laboratory)	Formaldehyde $	...	0.15	mg/m³	2.31	...	...	30	& Wet Gas	01/07/25	14:53 – 15:23	CEN/TS 13649:2014	UKAS / MCERTS	✓	Reaction Phase 3
	Butyraldehyde $	...	< 0.050	mg/m³	< 0.77	...	...	> 100	& Wet Gas	01/07/25	14:53 – 15:23	CEN/TS 13649:2014	UKAS / MCERTS	✓	
	Acetaldehyde $	...	0.87	mg/m³	13.40	...	...	11	& Wet Gas	01/07/25	14:53 – 15:23	CEN/TS 13649:2014	UKAS / MCERTS	✓	
	Propionaldehyde $	...	< 0.050	mg/m³	< 0.77	...	...	> 100	& Wet Gas	01/07/25	14:53 – 15:23	CEN/TS 13649:2014	UKAS / MCERTS	✓	
	Benzaldehyde $	...	< 0.050	mg/m³	< 0.77	...	...	> 100	& Wet Gas	01/07/25	14:53 – 15:23	CEN/TS 13649:2014	UKAS / MCERTS	✓	
	Valeraldehyde $	...	< 0.050	mg/m³	< 0.77	...	...	> 100	& Wet Gas	01/07/25	14:53 – 15:23	CEN/TS 13649:2014	UKAS / MCERTS	✓	
	Hexanal $	...	< 0.050	mg/m³	< 0.77	...	...	> 100	& Wet Gas	01/07/25	14:53 – 15:23	CEN/TS 13649:2014	UKAS / MCERTS	✓	
	Heptanal $	...	< 0.050	mg/m³	< 0.77	...	...	> 100	& Wet Gas	01/07/25	14:53 – 15:23	CEN/TS 13649:2014	NU	✓	
	Total Aldehydes $	...	< 1.31	mg/m³	< 20.18	...	...	12	& Wet Gas	01/07/25	14:53 – 15:23	CEN/TS 13649:2014	NU	✓	
	Total VOC $	...	7.97	mg/m³	122.80	...	...	11	& Wet Gas	01/07/25	14:53 – 15:23	CEN/TS 13649:2014	NU	✓	
	Speciated VOC (Acetone) $	...	6.65*	mg/m³	102.46	...	...	11	& Wet Gas	01/07/25	14:53 – 15:23	CEN/TS 13649:2014	NU	✓	
	Hydrofluoric Acid $	...	< 1.24	mg/m³	< 19.11	...	...	> 100	& Wet Gas	01/07/25	14:53 – 15:23	Based on CEN/TS 13649:2014	NA	✓	
	Hydrochloric Acid $	...	< 0.25	mg/m³	< 3.85	...	...	> 100	& Wet Gas	01/07/25	14:53 – 15:23	Based on CEN/TS 13649:2014	NA	✓	
	Nitric Acid $	...	< 0.49	mg/m³	< 7.55	...	...	> 100	& Wet Gas	01/07/25	14:53 – 15:23	Based on CEN/TS 13649:2014	NA	✓	
	Phosphoric Acid $	...	< 1.48	mg/m³	< 22.80	...	...	> 100	& Wet Gas	01/07/25	14:53 – 15:23	Based on CEN/TS 13649:2014	NA	✓	
	Sulphuric Acid $	...	< 0.49	mg/m³	< 7.55	...	...	> 100	& Wet Gas	01/07/25	14:53 – 15:23	Based on CEN/TS 13649:2014	NA	✓	
	Hydrogen Bromide $	...	< 0.49	mg/m³	< 7.55	...	...	> 100	& Wet Gas	01/07/25	14:53 – 15:23	Based on CEN/TS 13649:2014	NA	✓	
	Total Acids $	...	< 4.45	mg/m³	< 68.57	...	...	48	& Wet Gas	01/07/25	14:53 – 15:23	Based on CEN/TS 13649:2014	NA	✓	

***** Acetone was the only peak found on the GC-MS scan above the 1.25 mg/m³ limit of detection

DEScycle at Leicester University			**Installation Name**	**: Reaction Vessel**
Permit No	**: ...**		**Visit Details**	**: Investigative Emissions – July 2025**
Variation No	**: ...**		**Survey Dates**	**: 1st July 2025**
Report Ref	**: P6125**	**: R001**	**Report Issue Date**	**: 20th August 2025**

Notes

Emission Limit Value	The emission limit value is that stated in the permit and will be expressed as a concentration or a mass emission.
Periodic Monitoring Result	The result given is expressed in the same terms and units as the emission limit value.
Uncertainty	The uncertainty associated with the quoted result is at the 95% confidence interval. The Uncertainty results **DO NOT** take into account the effect of the sample location limitations.
Reference Conditions	All results are expressed at 273 K and 101.3kPa. The oxygen and moisture corrections are stated.
Monitoring Method Reference	The method stated is in accordance with the Environment Agency Technical Guidance Note M2, or other method approved by the Environment Agency.
Accreditation for use of Method	**The details indicate the accreditation for the use of the complete monitoring method, e.g. MCERTs, UKAS. If use of the method is not accredited " NA" is stated.**
Operating Status	The details indicate the feedstock and the loading rate of the plant during monitoring.
$	Chemical Analysis on sample reagents was performed by an External Laboratory as detailed in Section 4
NU	UKAS Accreditation Held but UKAS Accreditation cannot be claimed for the test as sampling did not comply with the Standard Reference Method (SRM), see section 2 & 5
NA	**Method is NOT UKAS Accredited.**

1.2 Operating Information

Any operating information and CEMS data below has been supplied by the client.

Emission Point Reference	Process Type	Process Duration	Fuel	Feedstock	Abatement	Load	Comparison of Operator CEMS and Periodic Monitoring Results					
							Parameter	Date	Time	CEMS Results	Periodic Monitoring Results	Units
Reaction Vessel	Batch	See Below	n/a	n/a	None	Normal	...	...	...	NP	...	...

Batch Information during testing:

Reaction Phase 1 (Solvents on only – 80ºC Operating Temperature)
Tube Tests 1 & 2

Reaction Phase 2 (DES 1 E Waste 80ºC Operating Temperature)
Tube Tests 3 & 4
150g of E waste into 1.5 litres of solvent

Reaction Phase 3 (DES 1 precipitation 50ºC Operating Temperature)
Tube Tests 5 & 6
6g per minute.

Notes:

Process Type	State whether the process is a continuous or batch process.
Process Duration	If a batch process, state the duration, frequency and details of the portion of the batch sampled. If continuous state "NA"
Fuel	If applicable, state the fuel type If not applicable state "NA"
Feedstock	State the feedstock type
Abatement	State the type and whether operational during monitoring. If not applicable state "NA"
Load	State the normal load, throughput or rating of the plant
CEMS Data	Enter this data for each CEM installed if it is has been provided by operator otherwise state “NP” (NOT PROVIDED)

2 Monitoring Deviations

The objective of the survey was to measure the concentrations of pollutants from the processes / locations as detailed in Section 1.

There were modifications to the sampling procedures (TPDs) listed in section 4. these are as follows. For the acid screen samples, sampling was made based on ECL/TPD/84 but using treated silica gel tubes (226-10-03).

There were no substance deviations from the original and agreed emissions monitoring schedule.

Non-conforming tests are as follows.

The Uncertainty of the reported concentrations for these pollutant results DOES NOT take into account the effect of non-conformities or sample location limitations.

Due to the very small diameter of the sample ductwork, it was not possible to use an in-stack sinter filter for the tube sampling trains, instead a small section of rigid stainless tube attached to the inlet of the sinter was inserted into the duct and the sinter remained outside the duct.

For the first speciated VOC test during reaction phase 2, greater than 5% of the total amount of organic compounds captured were found on the back up portion of the sorbent tube, so the efficiency check requirements were not met on this test and the reported results might be an underestimate of the total values.

Volumetric Flowrate tests during reaction phases 1 & 2 are non-conforming, (and cannot hold accreditation) This is because the flowrate in this duct during these tests was below the method limit of detection (5Pa).

ECL holds UKAS/MCERTS accreditation for the sampling of Speciated VOC however commercial laboratories in the UK cannot hold analytical accreditation for Total VOC/ Hydrocarbons nor for GC-MS scans, so accreditation for the results CANNOT be claimed.

ECL holds UKAS/MCERTS accreditation for the sampling of Aldehydes, and the subcontract laboratory hold UKAS/MCERTS accreditation for the analysis of MOST of the suite (apart from Heptanal for which they hold no accreditation). This means that for all individual aldehydes (apart from Heptanal) UKAS/MCERTS accreditation can be claimed for the final results. The final results for Heptanal and for the total group cannot hold any accreditation.

ECL does not hold any accreditation for the sampling of Acids using sorbent tubes and so the final results cannot hold any accreditation. The subcontract laboratory hold UKAS but not MCERTS accreditation for the analysis of MOST of the suite (apart from Hydrofluoric Acid for which they hold no accreditation).

Homogeneity tests have not been completed for pollutants at this sampling location. Such tests are not applicable to this location (as the process is not a combustion process and the duct area is <1m^2) and were not requested by the client.

PART 2 – SUPPORTING INFORMATION

3 SAMPLING STAFF DETAILS

Site Sampling Team

Names of Site Team	Dates on Site	MCERTS No.	LEVEL	Technical Endorsements
Jon Litterick	01/07/2025	MM 03 236	2	TE1, TE2, TE3, TE4
Scott Hackett	01/07/2025	MM 07 889	2	TE1, TE2, TE3, TE4

Report Reviewer

Name	MCERTS No.	LEVEL	Technical Endorsements
Andy Barnes	MM 03 235	2	TE1, TE2, TE3, TE4

Technical Endorsement Key:-

TE1 – **Isokinetic** Particulates, Temperature & Velocity Profiles, Oxygen.
TE2 – **Isokinetic** Extractive Pollutants:- Metals, Dioxin & Furans, PAHs, PCBs, HCl, HF.
TE3 – **Non-Isokinetic** Extractive Pollutants:- Speciated VOCs, HF, HCl, Cyanide.
TE4 – **Continuous Analysers** (Combustion Gases):- TVOC, CO, NOx, SO_2.

4 SAMPLING PROTOCOLS / METHODOLOGIES

Details of the substances monitored, the standard methods used and the Environmental Compliance Limited Technical Procedures used during this survey are shown in the table below. Detailed sampling protocols are included in a separate document which will be sent with the report.

In all cases, where analysis of collected samples was required, the analysis was by a subcontract laboratory. Details of the sub-contract laboratory are shown on the analysis certificates in this report. The UKAS/MCERTs accreditation status of the analysis is also indicated on the certificates.

Any required modifications to the Technical Procedure Documents (TPDs) specified below will be detailed in section 2 of this report.

Determinand	External Reference Method	ECL Technical Procedure Number
Velocity and Flowrate	BS EN 16911-1:2013 & MID	ECL/ TPD/ 022A
Aldehydes	CEN/TS 13649:2014	ECL / TPD / 084
Total & Speciated VOC	CEN/TS 13649:2014	ECL / TPD / 084
Acids (Sorbent Tubes)	Based on CEN/TS 13649:2014	Based on ECL / TPD / 084

5 SAMPLE POINT DESCRIPTIONS

The homogeneity test is applicable to combustion processes, but may also be requested by the regulator for non-combustion processes.

Homogeneity testing has not been completed at this location.

The test is not usually required for stacks with sampling plane areas of <1m^2 (below 1.13m in diameter for circular ducts).

The Uncertainty of the reported concentrations for these pollutant results DOES NOT take into account the effect of non-conformities or sample location limitations.

The sample location that was monitored is detailed below: -

Materials Laboratory – Reaction Vessel

The sample tube diameter is 0.045m and the width back from the sampling holes to the end of the work bench is 1.0m.

The reaction vessel is situated on a laboratory work bench at approximately waist height, with the sampling holes positioned 0.8m above this bench.

Four sample holes are located on a slightly raised horizontal section of tubing, the holes are positioned in series, one after the other.

Access to the sample location was via internal concrete steps within a main office / laboratory building. All sampling was undertaken in a laboratory office environment, where the reaction vessel was situated on a bench.

EQUIPMENT IDs
(Pre site checklist from SSP)

DEScycle at Leicester University
Permit No : ...
Variation No : ...
Report Ref : P6125 : R001

Installation Name : Reaction Vessel
Visit Details : Investigative Emissions – July 2025
Survey Dates : 1st July 2025
Report Issue Date : 20th August 2025

PRE SITE EQUIPMENT CHECKLIST/ EQUIPMENT USED

(Completed before departure to site and when on site in full)

Equipment	Equip. Type	ID No:	ID No:	ID No:	ID No:	ID No:	ID No:	ID No:	ID No:
MST console/pump	E001								
MST Nozzle set									
MST "S" Type Pitot									
MST Probe									
MST Probe Thermocouple									
MST Hot Box									
MST Impinger Arm									
Barometer		1320							
Site Balance									
Site Check weights									
Horiba	E002								
Heated Probe / Filter									
Chiller									
MFC									
Heated Line									
FID	E003								
Heated Line									
Heated Probe / Filter									
Testo	E004								
FTIR	E005								
Heated Probe / Filter									
Heated Line									
Stackmite	E006								
"L" Type Pitot		1319							
Digital Manometer		1318							
Stack Thermocouple		1244							
Thermocouple Reader		1317							
Nozzle Set									
Workhorse / Vapex Pumps	E007	1276	1277	1278					
Stack Thermocouple									
Tube Thermocouple		1031	1033	1038					
Meter Thermocouple		1030	1028	1032					
High Vac Gauge									
Dioxin Thermocouple									

Quantity of Ice Required / Used for Survey		Bags (2kg bags)

TABLES

DEScycle at Leicester University
Permit No : ...
Variation No : ...
Report Ref : P6125 : R001

Installation Name : Reaction Vessel
Visit Details : Investigative Emissions – July 2025
Survey Dates : 1st July 2025
Report Issue Date : 20th August 2025

Table 1 – Aldehydes (Phase 1 – Test 1)

Descycle Ltd

Leicester University Materials Laboratory Reaction Vessel

Emission Parameter	Units	Value
Stack Diameter	mm	45
Area of Sample Plane	m^2	0.002
Measured Oxygen (Dry)	%Vol	20.90
Meter Temperature	°C	25.67
StackTemperature	°C	26.00
Sample Date	…	01/07/20255
Sample Period	…	10:20 - 10:50
Sample Volume (as Measured)	m^3	0.0045
Sample Volume (reference Conditions)	m^3*	0.0041

Sample Tube Results		Aldehydes Test 1		Blank
Sample Reference ECL/25/2906	Units	Concentration*	Uncertainty	Concentration
Concentration of Formaldehyde	mg/m^3	0.098	50.26%	0.024
Concentration of Butyraldehyde	mg/m^3	0.049	100.13%	0.049
Concentration of Acetaldehyde	mg/m^3	0.049	60.22%	0.024
Concentration of Propionaldehyde	mg/m^3	0.049	100.13%	0.049
Concentration of Benzaldehyde	mg/m^3	0.049	100.13%	0.049
Concentration of Valeraldehyde	mg/m^3	0.049	100.13%	0.049
Concentration of Hexanal	mg/m^3	0.049	100.13%	0.049
Concentration of Heptanal	mg/m^3	0.024	100.13%	0.049
Total Aldehydes	mg/m^3	0.42	30.31%	…

***Reference Conditions: 273 K, 101.3 kPa, Wet Gas**

DEScycle at Leicester University
Permit No : ...
Variation No : ...
Report Ref : P6125 : R001

Installation Name : Reaction Vessel
Visit Details : Investigative Emissions – July 2025
Survey Dates : 1st July 2025
Report Issue Date : 20th August 2025

Table 2 – Aldehydes (Phase 1 – Test 2)

Descycle Ltd

Leicester University Materials Laboratory Reaction Vessel

Emission Parameter	Units	Value
Stack Diameter	mm	45
Area of Sample Plane	m^2	0.002
Measured Oxygen (Dry)	%Vol	20.90
Meter Temperature	°C	26.33
StackTemperature	°C	27.00
Sample Date	…	01/07/20255
Sample Period	…	11:00 - 11:30
Sample Volume (as Measured)	m^3	0.0045
Sample Volume (reference Conditions)	m^3*	0.0041

Sample Tube Results		Aldehydes Test 2		Blank
Sample Reference ECL/25/2907	Units	Concentration*	Uncertainty	Concentration
Concentration of Formaldehyde	mg/m^3	0.098	50.26%	0.025
Concentration of Butyraldehyde	mg/m^3	0.049	100.13%	0.049
Concentration of Acetaldehyde	mg/m^3	0.025	100.13%	0.025
Concentration of Propionaldehyde	mg/m^3	0.049	100.13%	0.049
Concentration of Benzaldehyde	mg/m^3	0.049	100.13%	0.049
Concentration of Valeraldehyde	mg/m^3	0.049	100.13%	0.049
Concentration of Hexanal	mg/m^3	0.049	100.13%	0.049
Concentration of Heptanal	mg/m^3	0.049	100.13%	0.049
Total Aldehydes	mg/m^3	0.42	31.74%	…

***Reference Conditions: 273 K, 101.3 kPa, Wet Gas**

DEScycle at Leicester University
Permit No : ...
Variation No : ...
Report Ref : P6125 : R001

Installation Name : Reaction Vessel
Visit Details : Investigative Emissions – July 2025
Survey Dates : 1st July 2025
Report Issue Date : 20th August 2025

Table 3 – Aldehydes (Phase 2 – Test 1)

Descycle Ltd

Leicester University Materials Laboratory Reaction Vessel

Emission Parameter	Units	Value
Stack Diameter	mm	45
Area of Sample Plane	m^2	0.002
Measured Oxygen (Dry)	%Vol	20.90
Meter Temperature	°C	27.00
StackTemperature	°C	28.00
Sample Date	…	01/07/20255
Sample Period	…	11:40 - 12:10
Sample Volume (as Measured)	m^3	0.0045
Sample Volume (reference Conditions)	m^3*	0.0040

Sample Tube Results		Aldehydes Test 3		Blank
Sample Reference ECL/25/2908	Units	Concentration*	Uncertainty	Concentration
Concentration of Formaldehyde	mg/m^3	0.074	50.26%	0.025
Concentration of Butyraldehyde	mg/m^3	0.050	100.13%	0.050
Concentration of Acetaldehyde	mg/m^3	0.69	11.24%	0.025
Concentration of Propionaldehyde	mg/m^3	0.050	100.13%	0.050
Concentration of Benzaldehyde	mg/m^3	0.050	100.13%	0.050
Concentration of Valeraldehyde	mg/m^3	0.050	100.13%	0.050
Concentration of Hexanal	mg/m^3	0.050	100.13%	0.050
Concentration of Heptanal	mg/m^3	0.050	100.13%	0.050
Total Aldehydes	mg/m^3	1.07	14.00%	…

***Reference Conditions: 273 K, 101.3 kPa, Wet Gas**

DEScycle at Leicester University
Permit No : ...
Variation No : ...
Report Ref : P6125 : R001

Installation Name : Reaction Vessel
Visit Details : Investigative Emissions – July 2025
Survey Dates : 1st July 2025
Report Issue Date : 20th August 2025

Table 4 – Aldehydes (Phase 2 – Test 2)

Descycle Ltd

Leicester University Materials Laboratory Reaction Vessel

Emission Parameter	Units	Value
Stack Diameter	mm	45
Area of Sample Plane	m^2	0.002
Measured Oxygen (Dry)	%Vol	20.90
Meter Temperature	°C	29.00
StackTemperature	°C	30.00
Sample Date	…	01/07/20255
Sample Period	…	13:02 - 13:32
Sample Volume (as Measured)	m^3	0.0045
Sample Volume (reference Conditions)	m^3*	0.0040

Sample Tube Results		Aldehydes Test 4		Blank
Sample Reference ECL/25/2909	Units	Concentration*	Uncertainty	Concentration
Concentration of Formaldehyde	mg/m^3	0.075	50.26%	0.025
Concentration of Butyraldehyde	mg/m^3	0.050	100.13%	0.050
Concentration of Acetaldehyde	mg/m^3	0.17	30.43%	0.025
Concentration of Propionaldehyde	mg/m^3	0.050	100.13%	0.050
Concentration of Benzaldehyde	mg/m^3	0.050	100.13%	0.050
Concentration of Valeraldehyde	mg/m^3	0.050	100.13%	0.050
Concentration of Hexanal	mg/m^3	0.050	100.13%	0.050
Concentration of Heptanal	mg/m^3	0.050	100.13%	0.050
Total Aldehydes	mg/m^3	0.55	25.26%	…

***Reference Conditions: 273 K, 101.3 kPa, Wet Gas**

Table 5 – Aldehydes (Phase 3 – Test 1)

Descycle Ltd

Leicester University Materials Laboratory Reaction Vessel

Emission Parameter	Units	Value
Stack Diameter	mm	45
Area of Sample Plane	m^2	0.002
Measured Oxygen (Dry)	%Vol	20.90
Meter Temperature	°C	29.00
StackTemperature	°C	29.33
Sample Date	…	01/07/20255
Sample Period	…	14:15 - 14:45
Sample Volume (as Measured)	m^3	0.0045
Sample Volume (reference Conditions)	m^3*	0.0040

Sample Tube Results		Aldehydes Test 5		Blank
Sample Reference ECL/25/2910	Units	Concentration*	Uncertainty	Concentration
Concentration of Formaldehyde	mg/m^3	0.15	30.43%	0.025
Concentration of Butyraldehyde	mg/m^3	0.050	100.13%	0.050
Concentration of Acetaldehyde	mg/m^3	1.07	11.23%	0.025
Concentration of Propionaldehyde	mg/m^3	0.050	100.13%	0.050
Concentration of Benzaldehyde	mg/m^3	0.050	100.13%	0.050
Concentration of Valeraldehyde	mg/m^3	0.050	100.13%	0.050
Concentration of Hexanal	mg/m^3	0.050	100.13%	0.050
Concentration of Heptanal	mg/m^3	0.050	100.13%	0.050
Total Aldehydes	mg/m^3	1.52	11.67%	…

***Reference Conditions: 273 K, 101.3 kPa, Wet Gas**

Table 6 – Aldehydes (Phase 3 – Test 2)

Descycle Ltd

Leicester University Materials Laboratory Reaction Vessel

Emission Parameter	Units	Value
Stack Diameter	mm	45
Area of Sample Plane	m^2	0.002
Measured Oxygen (Dry)	%Vol	20.90
Meter Temperature	°C	29.00
StackTemperature	°C	29.67
Sample Date	…	01/07/20255
Sample Period	…	14:53 - 15:23
Sample Volume (as Measured)	m^3	0.0045
Sample Volume (reference Conditions)	m^3*	0.0040

Sample Tube Results		Aldehydes Test 6		Blank
Sample Reference ECL/25/2911	Units	Concentration*	Uncertainty	Concentration
Concentration of Formaldehyde	mg/m^3	0.15	30.43%	0.025
Concentration of Butyraldehyde	mg/m^3	0.050	100.13%	0.050
Concentration of Acetaldehyde	mg/m^3	0.87	11.23%	0.025
Concentration of Propionaldehyde	mg/m^3	0.050	100.13%	0.050
Concentration of Benzaldehyde	mg/m^3	0.050	100.13%	0.050
Concentration of Valeraldehyde	mg/m^3	0.050	100.13%	0.050
Concentration of Hexanal	mg/m^3	0.050	100.13%	0.050
Concentration of Heptanal	mg/m^3	0.050	100.13%	0.050
Total Aldehydes	mg/m^3	1.31	12.35%	…

***Reference Conditions: 273 K, 101.3 kPa, Wet Gas**

DEScycle at Leicester University
Permit No : ...
Variation No : ...
Report Ref : P6125 : R001

Installation Name : Reaction Vessel
Visit Details : Investigative Emissions – July 2025
Survey Dates : 1st July 2025
Report Issue Date : 20th August 2025

Table 7 – Total Hydrocarbons (Phase 1 – Test 1)

Descycle Ltd

Leicester University Materials Laboratory Reaction Vessel

Emission Parameter	Units	Value
Stack Diameter	mm	45
Area of Sample Plane	m^2	0.002
Measured Oxygen (Dry)	%Vol	20.90
Meter Temperature	°C	25.67
StackTemperature	°C	26.00
Sample Date	...	01/07/2025
Sample Period	...	10:20 - 10:50
Sample Volume (as Measured)	m^3	0.0045
Sample Volume (reference Conditions)	m^3*	0.0041

Sample Tube Results		Total Hydrocarbons Test 1		Blank
Sample Reference ECL/25/2899	Units	Concentration*	Uncertainty	Concentration
Concentration of Total Hydrocarbons	mg/m^3	2.46	100.13%	2.46

***Reference Conditions: 273 K, 101.3 kPa, Wet Gas**

Table 8 – Total Hydrocarbons (Phase 1 – Test 2)

Descycle Ltd

Leicester University Materials Laboratory Reaction Vessel

Emission Parameter	Units	Value
Stack Diameter	mm	45
Area of Sample Plane	m^2	0.002
Measured Oxygen (Dry)	%Vol	20.90
Meter Temperature	°C	26.33
StackTemperature	°C	27.00
Sample Date	…	01/07/2025
Sample Period	…	11:00 - 11:30
Sample Volume (as Measured)	m^3	0.0045
Sample Volume (reference Conditions)	m^3*	0.0040

Sample Tube Results		Total Hydrocarbons Test 2		Blank
Sample Reference ECL/25/2900	Units	Concentration*	Uncertainty	Concentration
Concentration of Total Hydrocarbons	mg/m^3	2.47	100.13%	2.47

***Reference Conditions: 273 K, 101.3 kPa, Wet Gas**

DEScycle at Leicester University
Permit No : ...
Variation No : ...
Report Ref : P6125 : R001

Installation Name : Reaction Vessel
Visit Details : Investigative Emissions – July 2025
Survey Dates : 1st July 2025
Report Issue Date : 20th August 2025

Table 9 – Total Hydrocarbons (Phase 2 – Test 1)

Descycle Ltd

Leicester University Materials Laboratory Reaction Vessel

Emission Parameter	Units	Value
Stack Diameter	mm	45
Area of Sample Plane	m^2	0.002
Measured Oxygen (Dry)	%Vol	20.90
Meter Temperature	°C	27.00
StackTemperature	°C	28.00
Sample Date	…	01/07/2025
Sample Period	…	11:40 - 12:10
Sample Volume (as Measured)	m^3	0.0044
Sample Volume (reference Conditions)	m^3*	0.0040

Sample Tube Results		Total Hydrocarbons Test 3		Blank
Sample Reference ECL/25/2901	Units	Concentration*	Uncertainty	Concentration
Concentration of Total Hydrocarbons	mg/m^3	2.49	100.13%	2.49

***Reference Conditions: 273 K, 101.3 kPa, Wet Gas**

DEScycle at Leicester University
Permit No : ...
Variation No : ...
Report Ref : P6125 : R001

Installation Name : Reaction Vessel
Visit Details : Investigative Emissions – July 2025
Survey Dates : 1st July 2025
Report Issue Date : 20th August 2025

Table 10 – Total Hydrocarbons (Phase 2 – Test 2)

Descycle Ltd

Leicester University Materials Laboratory Reaction Vessel

Emission Parameter	Units	Value
Stack Diameter	mm	45
Area of Sample Plane	m^2	0.002
Measured Oxygen (Dry)	%Vol	20.90
Meter Temperature	°C	29.00
StackTemperature	°C	30.00
Sample Date	…	01/07/2025
Sample Period	…	13:02 - 13:32
Sample Volume (as Measured)	m^3	0.0045
Sample Volume (reference Conditions)	m^3*	0.0040

Sample Tube Results		Total Hydrocarbons Test 4		Blank
Sample Reference ECL/25/2902	Units	Concentration*	Uncertainty	Concentration
Concentration of Total Hydrocarbons	mg/m^3	2.50	100.13%	2.50

***Reference Conditions: 273 K, 101.3 kPa, Wet Gas**

DEScycle at Leicester University
Permit No : ...
Variation No : ...
Report Ref : P6125 : R001

Installation Name : Reaction Vessel
Visit Details : Investigative Emissions – July 2025
Survey Dates : 1st July 2025
Report Issue Date : 20th August 2025

Table 11 – Total Hydrocarbons (Phase 3 – Test 1)

Descycle Ltd

Leicester University Materials Laboratory Reaction Vessel

Emission Parameter	Units	Value
Stack Diameter	mm	45
Area of Sample Plane	m^2	0.002
Measured Oxygen (Dry)	%Vol	20.90
Meter Temperature	°C	29.00
StackTemperature	°C	29.33
Sample Date	...	01/07/2025
Sample Period	...	14:15 - 14:45
Sample Volume (as Measured)	m^3	0.0045
Sample Volume (reference Conditions)	m^3*	0.0040

Sample Tube Results		Total Hydrocarbons Test 5		Blank
Sample Reference ECL/25/2903	Units	Concentration*	Uncertainty	Concentration
Concentration of Total Hydrocarbons	mg/m^3	14.02	11.22%	2.50

***Reference Conditions: 273 K, 101.3 kPa, Wet Gas**

DEScycle at Leicester University
Permit No : ...
Variation No : ...
Report Ref : P6125 : R001

Installation Name : Reaction Vessel
Visit Details : Investigative Emissions – July 2025
Survey Dates : 1st July 2025
Report Issue Date : 20th August 2025

Table 12 – Total Hydrocarbons (Phase 3 – Test 2)

Descycle Ltd

Leicester University Materials Laboratory Reaction Vessel

Emission Parameter	Units	Value
Stack Diameter	mm	45
Area of Sample Plane	m^2	0.002
Measured Oxygen (Dry)	%Vol	20.90
Meter Temperature	°C	29.00
StackTemperature	°C	29.67
Sample Date	...	01/07/2025
Sample Period	...	14:53 - 15:23
Sample Volume (as Measured)	m^3	0.0045
Sample Volume (reference Conditions)	m^3*	0.0040

Sample Tube Results		Total Hydrocarbons Test 6		Blank
Sample Reference ECL/25/2904	Units	Concentration*	Uncertainty	Concentration
Concentration of Total Hydrocarbons	mg/m^3	7.97	11.22%	2.49

***Reference Conditions: 273 K, 101.3 kPa, Wet Gas**

Table 13 – Speciated VOC (Phase 1 – Test 1)

Descycle Ltd

Leicester University Materials Laboratory Reaction Vessel

Emission Parameter	Units	Value
Stack Diameter	mm	45
Area of Sample Plane	m^2	0.002
Measured Oxygen (Dry)	%Vol	20.90
Meter Temperature	°C	25.67
StackTemperature	°C	26.00
Sample Date	…	01/07/2025
Sample Period	…	10:20 - 10:50
Sample Volume (as Measured)	m^3	0.0045
Sample Volume (reference Conditions)	m^3*	0.0041

Sample Tube Results		Top 20 VOC Test 1		Blank
Sample Reference ECL/25/2899	Units	Concentration*	Uncertainty	Concentration
Concentration of Speciated VOC	mg/m^3	1.23	100.13%	1.23

***Reference Conditions: 273 K, 101.3 kPa, Wet Gas**

Table 14 – Speciated VOC (Phase 1 – Test 2)

Descycle Ltd

Leicester University Materials Laboratory Reaction Vessel

Emission Parameter	Units	Value
Stack Diameter	mm	45
Area of Sample Plane	m^2	0.002
Measured Oxygen (Dry)	%Vol	20.90
Meter Temperature	°C	26.33
StackTemperature	°C	27.00
Sample Date	…	01/07/2025
Sample Period	…	11:00 - 11:30
Sample Volume (as Measured)	m^3	0.0045
Sample Volume (reference Conditions)	m^3*	0.0040

Sample Tube Results		Top 20 VOC Test 2		Blank
Sample Reference ECL/25/2900	Units	Concentration*	Uncertainty	Concentration
Concentration of Speciated VOC	mg/m^3	1.23	100.13%	1.23

***Reference Conditions: 273 K, 101.3 kPa, Wet Gas**

Table 15 – Speciated VOC (Phase 2 – Test 1)

Descycle Ltd

Leicester University Materials Laboratory Reaction Vessel

Emission Parameter	Units	Value
Stack Diameter	mm	45
Area of Sample Plane	m^2	0.002
Measured Oxygen (Dry)	%Vol	20.90
Meter Temperature	°C	27.00
StackTemperature	°C	28.00
Sample Date	…	01/07/2025
Sample Period	…	11:40 - 12:10
Sample Volume (as Measured)	m^3	0.0044
Sample Volume (reference Conditions)	m^3*	0.0040

Sample Tube Results		Top 20 VOC Test 3		Blank
Sample Reference ECL/25/2901	Units	Concentration*	Uncertainty	Concentration
Concentration of Speciated VOC	mg/m^3	1.25	100.13%	1.25

***Reference Conditions: 273 K, 101.3 kPa, Wet Gas**

Table 16 – Speciated VOC (Phase 2 – Test 2)

Descycle Ltd

Leicester University Materials Laboratory Reaction Vessel

Emission Parameter	Units	Value
Stack Diameter	mm	45
Area of Sample Plane	m^2	0.002
Measured Oxygen (Dry)	%Vol	20.90
Meter Temperature	°C	29.00
StackTemperature	°C	30.00
Sample Date	…	01/07/2025
Sample Period	…	13:02 - 13:32
Sample Volume (as Measured)	m^3	0.0045
Sample Volume (reference Conditions)	m^3*	0.0040

Sample Tube Results		Top 20 VOC Test 4		Blank
Sample Reference ECL/25/2902	Units	Concentration*	Uncertainty	Concentration
Concentration of Speciated VOC	mg/m^3	1.25	100.13%	1.25

***Reference Conditions: 273 K, 101.3 kPa, Wet Gas**

Table 17 – Speciated VOC (Phase 3 – Test 1)

Descycle Ltd

Leicester University Materials Laboratory Reaction Vessel

Emission Parameter	Units	Value
Stack Diameter	mm	45
Area of Sample Plane	m^2	0.002
Measured Oxygen (Dry)	%Vol	20.90
Meter Temperature	°C	29.00
StackTemperature	°C	29.33
Sample Date	…	01/07/2025
Sample Period	…	14:15 - 14:45
Sample Volume (as Measured)	m^3	0.0045
Sample Volume (reference Conditions)	m^3*	0.0040

Sample Tube Results		Top 20 VOC Test 5		Blank
Sample Reference ECL/25/2903	Units	Concentration*	Uncertainty	Concentration
Concentration of Acetone	mg/m^3	12.74	11.22%	1.25

***Reference Conditions: 273 K, 101.3 kPa, Wet Gas**

Table 18 – Speciated VOC (Phase 3 – Test 2)

Descycle Ltd

Leicester University Materials Laboratory Reaction Vessel

Emission Parameter	Units	Value
Stack Diameter	mm	45
Area of Sample Plane	m^2	0.002
Measured Oxygen (Dry)	%Vol	20.90
Meter Temperature	°C	29.00
StackTemperature	°C	29.67
Sample Date	…	01/07/2025
Sample Period	…	14:53 - 15:23
Sample Volume (as Measured)	m^3	0.0045
Sample Volume (reference Conditions)	m^3*	0.0040

Sample Tube Results		Top 20 VOC Test 6		Blank
Sample Reference ECL/25/2904	Units	Concentration*	Uncertainty	Concentration
Concentration of Acetone	mg/m^3	6.65	11.22%	1.25

***Reference Conditions: 273 K, 101.3 kPa, Wet Gas**

Table 19 – Acids Screen (Phase 1 – Test 1)

Descycle Ltd

Leicester University Materials Laboratory Reaction Vessel

Emission Parameter	Units	Value
Stack Diameter	mm	45
Area of Sample Plane	m^2	0.002
Measured Oxygen (Dry)	%Vol	20.90
Meter Temperature	°C	25.67
StackTemperature	°C	26.00
Sample Date	…	01/07/2025
Sample Period	…	10:20 - 10:50
Sample Volume (as Measured)	m^3	0.0045
Sample Volume (reference Conditions)	m^3*	0.0041

Sample Tube Results		Acids Screen Test 1		Blank
Sample Reference ECL/25/2913	Units	Concentration*	Uncertainty	Concentration
Concentration of Hydrofluoric Acid	mg/m^3	1.23	100.13%	1.23
Concentration of Hydrochloric Acid	mg/m^3	0.25	100.13%	0.25
Concentration of Nitric Acid	mg/m^3	0.49	100.13%	0.49
Concentration of Phosphoric Acid	mg/m^3	1.47	100.13%	1.47
Concentration of Sulphuric Acid	mg/m^3	0.49	100.13%	0.49
Concentration of Hydrogen Bromide	mg/m^3	0.49	100.13%	0.49
Total Acids	mg/m^3	4.41	47.85%	…

***Reference Conditions: 273 K, 101.3 kPa, Wet Gas**

Table 20 – Acids Screen (Phase 1 – Test 2)

Descycle Ltd

Leicester University Materials Laboratory Reaction Vessel

Emission Parameter	Units	Value
Stack Diameter	mm	45
Area of Sample Plane	m^2	0.002
Measured Oxygen (Dry)	%Vol	20.90
Meter Temperature	°C	26.33
StackTemperature	°C	27.00
Sample Date	…	01/07/2025
Sample Period	…	11:05 - 11:35
Sample Volume (as Measured)	m^3	0.0044
Sample Volume (reference Conditions)	m^3*	0.0040

Sample Tube Results		Acids Screen Test 2		Blank
Sample Reference ECL/25/2914	Units	Concentration*	Uncertainty	Concentration
Concentration of Hydrofluoric Acid	mg/m^3	1.25	100.13%	1.25
Concentration of Hydrochloric Acid	mg/m^3	0.25	100.13%	0.25
Concentration of Nitric Acid	mg/m^3	0.50	100.13%	0.50
Concentration of Phosphoric Acid	mg/m^3	1.50	100.13%	1.50
Concentration of Sulphuric Acid	mg/m^3	0.50	100.13%	0.50
Concentration of Hydrogen Bromide	mg/m^3	0.50	100.13%	0.50
Total Acids	mg/m^3	4.51	47.85%	…

***Reference Conditions: 273 K, 101.3 kPa, Wet Gas**

Table 21 – Acids Screen (Phase 2 – Test 1)

Descycle Ltd

Leicester University Materials Laboratory Reaction Vessel

Emission Parameter	Units	Value
Stack Diameter	mm	45
Area of Sample Plane	m^2	0.002
Measured Oxygen (Dry)	%Vol	20.90
Meter Temperature	°C	27.00
StackTemperature	°C	28.00
Sample Date	…	01/07/2025
Sample Period	…	11:40 - 12:10
Sample Volume (as Measured)	m^3	0.0045
Sample Volume (reference Conditions)	m^3*	0.0041

Sample Tube Results		Acids Screen Test 3		Blank
Sample Reference ECL/25/2915	Units	Concentration*	Uncertainty	Concentration
Concentration of Hydrofluoric Acid	mg/m^3	1.23	100.13%	1.23
Concentration of Hydrochloric Acid	mg/m^3	0.25	100.13%	0.25
Concentration of Nitric Acid	mg/m^3	0.49	100.13%	0.49
Concentration of Phosphoric Acid	mg/m^3	1.48	100.13%	1.48
Concentration of Sulphuric Acid	mg/m^3	0.49	100.13%	0.49
Concentration of Hydrogen Bromide	mg/m^3	0.49	100.13%	0.49
Total Acids	mg/m^3	4.44	47.85%	…

***Reference Conditions: 273 K, 101.3 kPa, Wet Gas**

Table 22 – Acids Screen (Phase 2 – Test 2)

Descycle Ltd

Leicester University Materials Laboratory Reaction Vessel

Emission Parameter	Units	Value
Stack Diameter	mm	45
Area of Sample Plane	m^2	0.002
Measured Oxygen (Dry)	%Vol	20.90
Meter Temperature	°C	29.00
StackTemperature	°C	30.00
Sample Date	…	01/07/2025
Sample Period	…	13:02 - 13:32
Sample Volume (as Measured)	m^3	0.0045
Sample Volume (reference Conditions)	m^3*	0.0040

Sample Tube Results		Acids Screen Test 4		Blank
Sample Reference ECL/25/2916	Units	Concentration*	Uncertainty	Concentration
Concentration of Hydrofluoric Acid	mg/m^3	1.24	100.13%	1.24
Concentration of Hydrochloric Acid	mg/m^3	0.25	100.13%	0.25
Concentration of Nitric Acid	mg/m^3	0.50	100.13%	0.50
Concentration of Phosphoric Acid	mg/m^3	1.49	100.13%	1.49
Concentration of Sulphuric Acid	mg/m^3	0.50	100.13%	0.50
Concentration of Hydrogen Bromide	mg/m^3	0.50	100.13%	0.50
Total Acids	mg/m^3	4.47	47.85%	…

***Reference Conditions: 273 K, 101.3 kPa, Wet Gas**

Table 23 – Acids Screen (Phase 3 – Test 1)

Descycle Ltd

Leicester University Materials Laboratory Reaction Vessel

Emission Parameter	Units	Value
Stack Diameter	mm	45
Area of Sample Plane	m^2	0.002
Measured Oxygen (Dry)	%Vol	20.90
Meter Temperature	°C	29.00
StackTemperature	°C	29.33
Sample Date	…	01/07/2025
Sample Period	…	14:15 - 14:45
Sample Volume (as Measured)	m^3	0.0045
Sample Volume (reference Conditions)	m^3*	0.0040

Sample Tube Results		Acids Screen Test 5		Blank
Sample Reference ECL/25/2917	Units	Concentration*	Uncertainty	Concentration
Concentration of Hydrofluoric Acid	mg/m^3	1.24	100.13%	1.24
Concentration of Hydrochloric Acid	mg/m^3	0.25	100.13%	0.25
Concentration of Nitric Acid	mg/m^3	0.50	100.13%	0.50
Concentration of Phosphoric Acid	mg/m^3	1.49	100.13%	1.49
Concentration of Sulphuric Acid	mg/m^3	0.50	100.13%	0.50
Concentration of Hydrogen Bromide	mg/m^3	0.50	100.13%	0.50
Total Acids	mg/m^3	4.47	47.85%	…

***Reference Conditions: 273 K, 101.3 kPa, Wet Gas**

Table 24 – Acids Screen (Phase 3 – Test 2)

Descycle Ltd

Leicester University Materials Laboratory Reaction Vessel

Emission Parameter	Units	Value
Stack Diameter	mm	45
Area of Sample Plane	m^2	0.002
Measured Oxygen (Dry)	%Vol	20.90
Meter Temperature	°C	29.00
StackTemperature	°C	29.67
Sample Date	…	01/07/2025
Sample Period	…	14:53 - 15:23
Sample Volume (as Measured)	m^3	0.0045
Sample Volume (reference Conditions)	m^3*	0.0040

Sample Tube Results		Acids Screen Test 6		Blank
Sample Reference ECL/25/2918	Units	Concentration*	Uncertainty	Concentration
Concentration of Hydrofluoric Acid	mg/m^3	1.24	100.13%	1.24
Concentration of Hydrochloric Acid	mg/m^3	0.25	100.13%	0.25
Concentration of Nitric Acid	mg/m^3	0.49	100.13%	0.49
Concentration of Phosphoric Acid	mg/m^3	1.48	100.13%	1.48
Concentration of Sulphuric Acid	mg/m^3	0.49	100.13%	0.49
Concentration of Hydrogen Bromide	mg/m^3	0.49	100.13%	0.49
Total Acids	mg/m^3	4.45	47.85%	…

***Reference Conditions: 273 K, 101.3 kPa, Wet Gas**

VELOCITY TRAVERSE PROFILES

Environmental Compliance Limited

DEScycle at Leicester University
Permit No : ...
Variation No : ...
Report Ref : P6125 : R001

Installation Name : Reaction Vessel
Visit Details : Investigative Emissions – July 2025
Survey Dates : 1st July 2025
Report Issue Date : 20th August 2025

Environmental Compliance Limited	Traverse Data Profoma	Date of Measurement	01/07/2025

Company	Descycle Ltd	Stack Diameter Port A (mm)	45	Average Stack Diameter (mm)	45	Pitot tube coefficient	0.99
Site	Leicester University	Stack Diameter Port B (mm)		Port Length (mm)	3	Pitot Id	1319
Location	Materials Laboratory	Duct Length Port A (mm)		Average Duct Length (mm) L		Stack Thermocouple ID	1244
Stack	Reaction Vessel	Duct Length Port B (mm)		Duct width (mm) B		Stack Temp Reader ID	1317
Job No	P6125	Duct Length Port C (mm)		Barometric Pressure. (mb)	1006	Manometer ID	1318
Operators	SH & JL	Duct Length Port D (mm)		Ave Static Press. (mm H_20)	0.05	Barometer ID	1320

Pre - Traverse Checks Carried Out	Time	Pass/ Fail
Pre - Traverse PITOT Visual Inspection	10:15:00	Pass
Pre - Traverse PITOT Leak Check	10:17:00	Pass

Smooth Walls

Static Pressure Readings (Pascals)			
Port A	Port B	Port C	Port D
0.50			

Port/ Point	Distance to Point (mm)	Time	Temperature Readings (°C)			(ΔP) Pitot Readings (Pa)			Average Temp. (°C)	Average (ΔP) (Pa)	Swirl Test ° From Reference
			1	2	3	1	2	3			
A1	23	10:25:00	26.3	26.3	26.3	2.2	2.2	2.1	26.3	2.2	0
Blockage Check @ A1 (L-Type Pitot Only)		10:28:00	26.3	26.4	26.4	2.2	2.2	2.1	26.3	2.2	Total
			Mean		26.4	Mean		2.2	26.3	2.2	Max
			Difference <5% from Initial ?		0.02	Difference <5% from Initial ?		0.00	26.3	2.2	Min
									26.3	2.2	Average

Stagnation Check (S-type Pitot Only)	Time	Reading
Static Pressure Via Positive Leg (Pa)		
Static Pressure Via Negative Leg (Pa)		
Difference (Pa) < 10Pa ?		

Post - Traverse Checks Carried Out	Time	Pass/ Fail
Post - Traverse Visual Inspection	10:30:00	Pass
Post - Traverse PITOT Leak Check	10:32:00	Pass

Average temp (K)	299.300

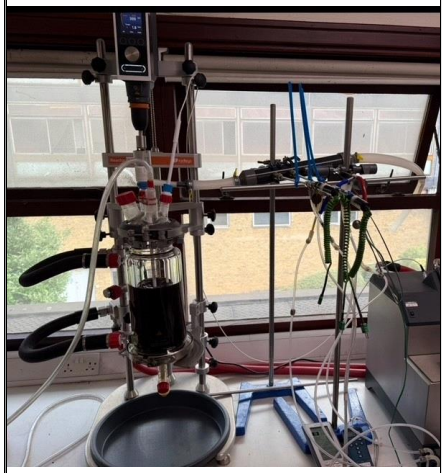
Suitability of Sampling Position	Actual Stack Conditions
Highest:lowest flow pressure ratio < 9:1?	1.02:1
Maximum deviation of flow from axis <15° ?	0
X-sectional area for stacks= πr2	0.00 m^2
X-sectional area for ducts = L x B	m^2
Suitability of Position for Sampling	OK

Stack Moisture	0.1	%	Gas Velocity (as Measured) Adjusted for Smooth Walls	1.89892	m/sec
Measured Oxygen	20.90	%	Gas Velocity (Reference Conditions) Adjusted for Smooth Walls	1.72010	m/sec*
Measured Carbon Dioxide	0.04	%	Volumetric Flowrate (as Measured) Adjusted for Smooth Walls	0.00302	m^3/sec
Dry Gas Molecular Weight	28.84240	g/g mole	Volumetric Flowrate (Ref Cond) Adjusted for Smooth Walls	0.00274	m^3/sec*

*Reference Conditions: 273K, 101.3kPa, Wet Gas

NOTE: Velocity / volume flowrate calculations exclude contributions from the measurement point(s) where swirl >15°

Diagram/ Description of Cross Section of Stack/Duct



Notes
Including expected or actual deviations from procedures / non-conformities

Flow recorded below 5Pa method LOD

Reaction Phase 1

Compliance With Positional Requirements?

Height of sample ports from Platform	0.8m
Number of sample ports	4
Width of platform (port back to handrail)	1.0m

Nearest downstream disturbance	Diameter Change Nozzle	0.13m
Nearest upstream disturbance	Diameter Change Nozzle	0.10m
Disturbances are classed as bends, fans or diameter variations		

Environmental Compliance Limited

DEScycle at Leicester University
Permit No : ...
Variation No : ...
Report Ref : P6125 : R001

Installation Name : Reaction Vessel
Visit Details : Investigative Emissions – July 2025
Survey Dates : 1st July 2025
Report Issue Date : 20th August 2025

Environmental Compliance Limited	Traverse Data Profoma	Date of Measurement	01/07/2025

Company	Descycle Ltd	Stack Diameter Port A (mm)	45	Average Stack Diameter (mm)	45	Pitot tube coefficient	0.99
Site	Leicester University	Stack Diameter Port B (mm)		Port Length (mm)	3	Pitot Id	1319
Location	Materials Laboratory	Duct Length Port A (mm)		Average Duct Length (mm) L		Stack Thermocouple ID	1244
Stack	Reaction Vessel	Duct Length Port B (mm)		Duct width (mm) B		Stack Temp Reader ID	1317
Job No	P6125	Duct Length Port C (mm)		Barometric Pressure. (mb)	1006	Manometer ID	1318
Operators	SH & JL	Duct Length Port D (mm)		Ave Static Press. (mm H_20)	0.05	Barometer ID	1320

Pre - Traverse Checks Carried Out	Time	Pass/ Fail
Pre - Traverse PITOT Visual Inspection	11:45:00	Pass
Pre - Traverse PITOT Leak Check	11:47:00	Pass

Smooth Walls

Static Pressure Readings (Pascals)			
Port A	Port B	Port C	Port D
0.50			

Port/ Point	Distance to Point (mm)	Time	Temperature Readings (°C) 1	2	3	(ΔP) Pitot Readings (Pa) 1	2	3	Average Temp. (°C)	Average (ΔP) (Pa)	Swirl Test ° From Reference
A1	23	11:50:00	28.4	28.4	28.3	4.6	4.5	4.5	28.4	4.5	0
Blockage Check @ A1 (L-Type Pitot Only)		11:52:00	28.3	28.4	28.5	4.5	4.6	4.6	28.4	4.5	Total
			Mean		28.4	Mean		4.6	28.4	4.5	Max
			Difference <5% from Initial ?		0.01	Difference <5% from Initial ?		0.74	28.4	4.5	Min
									28.4	4.5	Average

Stagnation Check (S-type Pitot Only)	Time	Reading
Static Pressure Via Positive Leg (Pa)		
Static Pressure Via Negative Leg (Pa)		
Difference (Pa) < 10Pa ?		

Post - Traverse Checks Carried Out	Time	Pass/ Fail
Post - Traverse Visual Inspection	11:54:00	Pass
Post - Traverse PITOT Leak Check	11:56:00	Pass

Average temp (K)	301.367

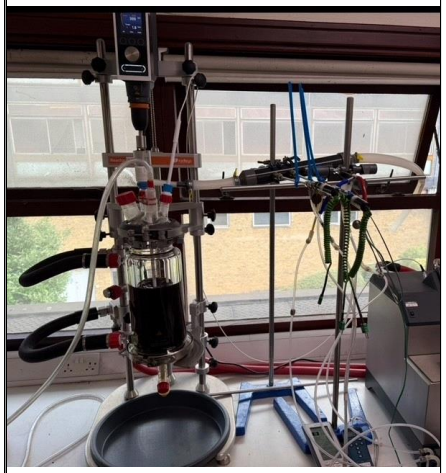
Suitability of Sampling Position	Actual Stack Conditions
Highest:lowest flow pressure ratio < 9:1?	1.01:1
Maximum deviation of flow from axis <15° ?	0
X-sectional area for stacks= πr2	0.00 m^2
X-sectional area for ducts = L x B	m^2
Suitability of Position for Sampling	OK

Stack Moisture	0.1	%	Gas Velocity (as Measured) Adjusted for Smooth Walls	2.75622	m/sec
Measured Oxygen	20.90	%	Gas Velocity (Reference Conditions) Adjusted for Smooth Walls	2.47954	m/sec*
Measured Carbon Dioxide	0.04	%	Volumetric Flowrate (as Measured) Adjusted for Smooth Walls	0.00438	m^3/sec
Dry Gas Molecular Weight	28.84240	g/g mole	Volumetric Flowrate (Ref Cond) Adjusted for Smooth Walls	0.00394	m^3/sec*

*Reference Conditions: 273K, 101.3kPa, Wet Gas

NOTE: Velocity / volume flowrate calculations exclude contributions from the measurement point(s) where swirl >15°

Diagram/ Description of Cross Section of Stack/Duct



Notes
Including expected or actual deviations from procedures / non-conformities

Flow recorded below 5Pa method LOD

Reaction Phase 2

Compliance With Positional Requirements?

Height of sample ports from Platform	0.8m
Number of sample ports	4
Width of platform (port back to handrail)	1.0m

Nearest downstream disturbance	Diameter Change Nozzle	0.13m
Nearest upstream disturbance	Diameter Change Nozzle	0.10m
Disturbances are classed as bends, fans or diameter variations		

Environmental Compliance Limited

DEScycle at Leicester University
Permit No : ...
Variation No : ...
Report Ref : P6125 : R001

Installation Name : Reaction Vessel
Visit Details : Investigative Emissions – July 2025
Survey Dates : 1st July 2025
Report Issue Date : 20th August 2025

Environmental Compliance Limited	Traverse Data Profoma	Date of Measurement	01/07/2025

Company	Descycle Ltd	Stack Diameter Port A (mm)	45	Average Stack Diameter (mm)	45	Pitot tube coefficient	0.99
Site	Leicester University	Stack Diameter Port B (mm)		Port Length (mm)	3	Pitot Id	1319
Location	Materials Laboratory	Duct Length Port A (mm)		Average Duct Length (mm) L		Stack Thermocouple ID	1244
Stack	Reaction Vessel	Duct Length Port B (mm)		Duct width (mm) B		Stack Temp Reader ID	1317
Job No	P6125	Duct Length Port C (mm)		Barometric Pressure. (mb)	1006	Manometer ID	1318
Operators	SH & JL	Duct Length Port D (mm)		Ave Static Press. (mm H_20)	0.05	Barometer ID	1320

Pre - Traverse Checks Carried Out	Time	Pass/ Fail
Pre - Traverse PITOT Visual Inspection	14:22:00	Pass
Pre - Traverse PITOT Leak Check	14:24:00	Pass

Smooth Walls

Static Pressure Readings (Pascals)			
Port A	Port B	Port C	Port D
0.50			

Port/ Point	Distance to Point (mm)	Time	Temperature Readings (°C) 1	2	3	(ΔP) Pitot Readings (Pa) 1	2	3	Average Temp. (°C)	Average (ΔP) (Pa)	Swirl Test ° From Reference
A1	23	14:30:00	29.8	29.6	29.5	5.4	5.6	5.1	29.6	5.4	0
Blockage Check @ A1 (L-Type Pitot Only)		14:33:00	29.5	29.4	29.4	5.2	5.4	5.3	29.6	5.4	Total
			Mean		29.4	Mean		5.3	29.6	5.4	Max
			Difference <5% from Initial ?		-0.07	Difference <5% from Initial ?		-1.24	29.6	5.4	Min
									29.6	5.4	Average

Stagnation Check (S-type Pitot Only)	Time	Reading
Static Pressure Via Positive Leg (Pa)		
Static Pressure Via Negative Leg (Pa)		
Difference (Pa) < 10Pa ?		

Post - Traverse Checks Carried Out	Time	Pass/ Fail
Post - Traverse Visual Inspection	14:35:00	Pass
Post - Traverse PITOT Leak Check	14:37:00	Pass

Average temp (K)	302.633

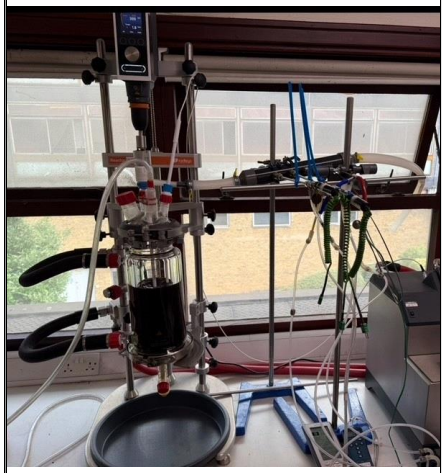
Suitability of Sampling Position	Actual Stack Conditions
Highest:lowest flow pressure ratio < 9:1?	1.01:1
Maximum deviation of flow from axis <15° ?	0
X-sectional area for stacks= πr2	0.00 m^2
X-sectional area for ducts = L x B	m^2
Suitability of Position for Sampling	OK

Stack Moisture	0.1	%	Gas Velocity (as Measured) Adjusted for Smooth Walls	3.00516	m/sec
Measured Oxygen	20.90	%	Gas Velocity (Reference Conditions) Adjusted for Smooth Walls	2.69218	m/sec*
Measured Carbon Dioxide	0.04	%	Volumetric Flowrate (as Measured) Adjusted for Smooth Walls	0.00478	m^3/sec
Dry Gas Molecular Weight	28.84240	g/g mole	Volumetric Flowrate (Ref Cond) Adjusted for Smooth Walls	0.00428	m^3/sec*

*Reference Conditions: 273K, 101.3kPa, Wet Gas

NOTE: Velocity / volume flowrate calculations exclude contributions from the measurement point(s) where swirl >15°

Diagram/ Description of Cross Section of Stack/Duct



Notes
Including expected or actual deviations from procedures / non-conformities

Reaction Phase 3

Compliance With Positional Requirements?

Height of sample ports from Platform	0.8m
Number of sample ports	4
Width of platform (port back to handrail)	1.0m

Nearest downstream disturbance	Diameter Change Nozzle	0.13m
Nearest upstream disturbance	Diameter Change Nozzle	0.10m
Disturbances are classed as bends, fans or diameter variations		

FIELD SAMPLING DATA

DEScycle at Leicester University
Permit No : ...
Variation No : ...
Report Ref : P6125 : R001

Installation Name : Reaction Vessel
Visit Details : Investigative Emissions – July 2025
Survey Dates : 1st July 2025
Report Issue Date : 20th August 2025

Environmental Compliance Limited				SAMPLE TUBE DATA SAMPLING PROFORMA (VAPEX ONLY)	
Client	Descycle Ltd	◉ Circular ○ Rectangular ○ Elipse		Vapex Pump ID	1276
Site	Leicester University	Stack Diameter (mm)	45		
Location	Materials Laboratory				
Stack ID	Reaction Vessel	Stack Area (m^2)	0.002		
Test No	Aldehydes Test 1	Barometric Pressure (mb)	1006	Meter Yd	0.994
Job No	P6125	Stack Thermocouple ID	1244		
ECL Site Staff	SH & JL	Tube Thermocouple ID	1031		
Barometer ID	1320	Meter Thermocouple ID	1030	Vapex Sampling Rate (ml/min)	150
		In-Stack Sinter Used (Y/N)	Y		

Date of Test	01/07/20255
Sample Start Time	10:20
Sample End Time	10:50
Duration	30
Measured O2	20.90
O2 Uncertainty %Vol	1.25
Meter Start Time	0:00:00
Meter End Time	0:30:00
Meter Elapsed Time	0:30:00
Impinger 1	None Used
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Meter Units: ◉ litres

	Sample	Pre-test Leak Check		Post-test Leak Check		Total
Start Volume	0.00	Time	10:08:00	Time	10:53:00	
Final Volume	4.54	Reading (ml/min)	19	Reading (ml/min)	20	
Total Volume	4.53	% Leak	4.2	% Leak	4.4	4.53
Sample Train Internal Volume	0.010	Litres				

Pre and post test leak checks are mandatory. The pump must be set to 450 ml/min during leak checks. Pass rate in CEN TS 13649 is 5%

Sample Point	A1	A1	A1	
Time/ point (mins)	0 - 10	10 - 20	20 - 30	
Tube Temp °C	25	26	26	
Stack Temp °C	26	26	26	
Meter Temp °C	25	26	26	
Pump Flowrate (ml/min)	150	150	150	

Impinger 2	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Sample Point				
Time/ point (mins)				
Tube Temp °C				
Stack Temp °C				
Meter Temp °C				
Pump Flowrate (ml/min)				

Impinger3	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Sample Point				
Time/ point (mins)				
Tube Temp °C				
Stack Temp °C				
Meter Temp °C				
Pump Flowrate (ml/min)				

Silica	(IF USED)
<50% Spent at end Y/N?	Yes
Sample train upstream of sorbent tube condensation free for entire sample (Y/N)	Yes

Environmental Compliance Limited				SAMPLE TUBE DATA SAMPLING PROFORMA (VAPEX ONLY)	
Client	Descycle Ltd	◉ Circular ○ Rectangular ○ Elipse		Vapex Pump ID	1276
Site	Leicester University	Stack Diameter (mm)	45		
Location	Materials Laboratory				
Stack ID	Reaction Vessel	Stack Area (m^2)	0.002		
Test No	Aldehydes Test 2	Barometric Pressure (mb)	1006	Meter Yd	0.994
Job No	P6125	Stack Thermocouple ID	1244		
ECL Site Staff	SH & JL	Tube Thermocouple ID	1031		
Barometer ID	1320	Meter Thermocouple ID	1030	Vapex Sampling Rate (ml/min)	150
		In-Stack Sinter Used (Y/N)	Y		

Date of Test	01/07/20255
Sample Start Time	11:00
Sample End Time	11:30
Duration	30
Measured O2	20.90
O2 Uncertainty %Vol	1.25
Meter Start Time	0:00:00
Meter End Time	0:30:00
Meter Elapsed Time	0:30:00
Impinger 1	None Used
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Meter Units: ◉ litres

	Sample	Pre-test Leak Check		Post-test Leak Check		Total
Start Volume	0.00	Time	10:57:00	Time	11:34:00	
Final Volume	4.53	Reading (ml/min)	20	Reading (ml/min)	21	
Total Volume	4.52	% Leak	4.4	% Leak	4.7	4.52
Sample Train Internal Volume	0.010	Litres				

Pre and post test leak checks are mandatory. The pump must be set to 450 ml/min during leak checks. Pass rate in CEN TS 13649 is 5%

Sample Point	A1	A1	A1	
Time/ point (mins)	0 - 10	10 - 20	20 - 30	
Tube Temp °C	26	26	27	
Stack Temp °C	27	27	27	
Meter Temp °C	26	26	27	
Pump Flowrate (ml/min)	150	150	150	

Impinger 2	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Sample Point				
Time/ point (mins)				
Tube Temp °C				
Stack Temp °C				
Meter Temp °C				
Pump Flowrate (ml/min)				

Impinger3	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Sample Point				
Time/ point (mins)				
Tube Temp °C				
Stack Temp °C				
Meter Temp °C				
Pump Flowrate (ml/min)				

Silica	(IF USED)
<50% Spent at end Y/N?	Yes
Sample train upstream of sorbent tube condensation free for entire sample (Y/N)	Yes

Environmental Compliance Limited

DEScycle at Leicester University
Permit No : ...
Variation No : ...
Report Ref : P6125 : R001

Installation Name : Reaction Vessel
Visit Details : Investigative Emissions – July 2025
Survey Dates : 1st July 2025
Report Issue Date : 20th August 2025

Environmental Compliance Limited				SAMPLE TUBE DATA SAMPLING PROFORMA (VAPEX ONLY)	
Client	Descycle Ltd	◉ Circular ○ Rectangular ○ Elipse		Vapex Pump ID	1276
Site	Leicester University	Stack Diameter (mm)	45		
Location	Materials Laboratory				
Stack ID	Reaction Vessel	Stack Area (m^2)	0.002		
Test No	Aldehydes Test 3	Barometric Pressure (mb)	1006	Meter Yd	0.994
Job No	P6125	Stack Thermocouple ID	1244		
ECL Site Staff	SH & JL	Tube Thermocouple ID	1031		
Barometer ID	1320	Meter Thermocouple ID	1030	Vapex Sampling Rate (ml/min)	150
		In-Stack Sinter Used (Y/N)	Y		

Date of Test	01/07/20255
Sample Start Time	11:40
Sample End Time	12:10
Duration	30
Measured O2	20.90
O2 Uncertainty %Vol	1.25
Meter Start Time	0:00:00
Meter End Time	0:30:00
Meter Elapsed Time	0:30:00
Impinger 1	None Used
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Meter Units: ◉ litres

Sample		Pre-test Leak Check		Post-test Leak Check		Total
Start Volume	0.00	Time	11:38:00	Time	12:12:00	
Final Volume	4.50	Reading (ml/min)	20	Reading (ml/min)	20	
Total Volume	4.49	% Leak	4.4	% Leak	4.4	4.49
Sample Train Internal Volume	0.010	Litres				

Pre and post test leak checks are mandatory. The pump must be set to 450 ml/min during leak checks. Pass rate in CEN TS 13649 is 5%

Sample Point	A1	A1	A1	
Time/ point (mins)	0 - 10	10 - 20	20 - 30	
Tube Temp °C	27	27	27	
Stack Temp °C	28	28	28	
Meter Temp °C	27	27	27	
Pump Flowrate (ml/min)	150	150	150	

Impinger 2	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Sample Point				
Time/ point (mins)				
Tube Temp °C				
Stack Temp °C				
Meter Temp °C				
Pump Flowrate (ml/min)				

Impinger3	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Sample Point				
Time/ point (mins)				
Tube Temp °C				
Stack Temp °C				
Meter Temp °C				
Pump Flowrate (ml/min)				

Silica	(IF USED)
<50% Spent at end Y/N?	Yes
Sample train upstream of sorbent tube condensation free for entire sample (Y/N)	Yes

Environmental Compliance Limited				SAMPLE TUBE DATA SAMPLING PROFORMA (VAPEX ONLY)	
Client	Descycle Ltd	◉ Circular ○ Rectangular ○ Elipse		Vapex Pump ID	1276
Site	Leicester University	Stack Diameter (mm)	45		
Location	Materials Laboratory				
Stack ID	Reaction Vessel	Stack Area (m^2)	0.002		
Test No	Aldehydes Test 4	Barometric Pressure (mb)	1006	Meter Yd	0.994
Job No	P6125	Stack Thermocouple ID	1244		
ECL Site Staff	SH & JL	Tube Thermocouple ID	1031		
Barometer ID	1320	Meter Thermocouple ID	1030	Vapex Sampling Rate (ml/min)	150
		In-Stack Sinter Used (Y/N)	Y		

Date of Test	01/07/20255
Sample Start Time	13:02
Sample End Time	13:32
Duration	30
Measured O2	20.90
O2 Uncertainty %Vol	1.25
Meter Start Time	0:00:00
Meter End Time	0:30:00
Meter Elapsed Time	0:30:00
Impinger 1	None Used
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Meter Units: ◉ litres

Sample		Pre-test Leak Check		Post-test Leak Check		Total
Start Volume	0.00	Time	12:16:00	Time	13:33:00	
Final Volume	4.51	Reading (ml/min)	20	Reading (ml/min)	21	
Total Volume	4.50	% Leak	4.4	% Leak	4.7	4.50
Sample Train Internal Volume	0.010	Litres				

Pre and post test leak checks are mandatory. The pump must be set to 450 ml/min during leak checks. Pass rate in CEN TS 13649 is 5%

Sample Point	A1	A1	A1	
Time/ point (mins)	0 - 10	10 - 20	20 - 30	
Tube Temp °C	29	29	29	
Stack Temp °C	30	30	30	
Meter Temp °C	29	29	29	
Pump Flowrate (ml/min)	150	150	150	

Impinger 2	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Sample Point				
Time/ point (mins)				
Tube Temp °C				
Stack Temp °C				
Meter Temp °C				
Pump Flowrate (ml/min)				

Impinger3	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Sample Point				
Time/ point (mins)				
Tube Temp °C				
Stack Temp °C				
Meter Temp °C				
Pump Flowrate (ml/min)				

Silica	(IF USED)
<50% Spent at end Y/N?	Yes
Sample train upstream of sorbent tube condensation free for entire sample (Y/N)	Yes

DEScycle at Leicester University
Permit No : ...
Variation No : ...
Report Ref : P6125 : R001

Installation Name : Reaction Vessel
Visit Details : Investigative Emissions – July 2025
Survey Dates : 1st July 2025
Report Issue Date : 20th August 2025

Environmental Compliance Limited				SAMPLE TUBE DATA SAMPLING PROFORMA (VAPEX ONLY)	
Client	Descycle Ltd	◉ Circular ○ Rectangular ○ Elipse		Vapex Pump ID	1276
Site	Leicester University	Stack Diameter (mm)	45		
Location	Materials Laboratory				
Stack ID	Reaction Vessel	Stack Area (m^2)	0.002		
Test No	Aldehydes Test 5	Barometric Pressure (mb)	1006	Meter Yd	0.994
Job No	P6125	Stack Thermocouple ID	1244		
ECL Site Staff	SH & JL	Tube Thermocouple ID	1031		
Barometer ID	1320	Meter Thermocouple ID	1030	Vapex Sampling Rate (ml/min)	150
		In-Stack Sinter Used (Y/N)	Y		

Date of Test	01/07/20255
Sample Start Time	14:15
Sample End Time	14:45
Duration	30
Measured O2	20.90
O2 Uncertainty %Vol	1.25
Meter Start Time	0:00:00
Meter End Time	0:30:00
Meter Elapsed Time	0:30:00
Impinger 1	None Used
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Meter Units: ◉ litres

Sample		Pre-test Leak Check		Post-test Leak Check		Total
Start Volume	0.00	Time	13:39:00	Time	14:47:00	
Final Volume	4.51	Reading (ml/min)	21	Reading (ml/min)	20	
Total Volume	4.50	% Leak	4.7	% Leak	4.4	4.50
Sample Train Internal Volume	0.010	Litres				

Pre and post test leak checks are mandatory. The pump must be set to 450 ml/min during leak checks. Pass rate in CEN TS 13649 is 5%

Sample Point	A1	A1	A1	
Time/ point (mins)	0 - 10	10 - 20	20 - 30	
Tube Temp °C	29	29	29	
Stack Temp °C	30	29	29	
Meter Temp °C	29	29	29	
Pump Flowrate (ml/min)	150	150	150	

Impinger 2	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Sample Point				
Time/ point (mins)				
Tube Temp °C				
Stack Temp °C				
Meter Temp °C				
Pump Flowrate (ml/min)				

Impinger3	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Sample Point				
Time/ point (mins)				
Tube Temp °C				
Stack Temp °C				
Meter Temp °C				
Pump Flowrate (ml/min)				

Silica	(IF USED)
<50% Spent at end Y/N?	Yes
Sample train upstream of sorbent tube condensation free for entire sample (Y/N)	Yes

Environmental Compliance Limited				SAMPLE TUBE DATA SAMPLING PROFORMA (VAPEX ONLY)	
Client	Descycle Ltd	◉ Circular ○ Rectangular ○ Elipse		Vapex Pump ID	1276
Site	Leicester University	Stack Diameter (mm)	45		
Location	Materials Laboratory				
Stack ID	Reaction Vessel	Stack Area (m^2)	0.002		
Test No	Aldehydes Test 6	Barometric Pressure (mb)	1006	Meter Yd	0.994
Job No	P6125	Stack Thermocouple ID	1244		
ECL Site Staff	SH & JL	Tube Thermocouple ID	1031		
Barometer ID	1320	Meter Thermocouple ID	1030	Vapex Sampling Rate (ml/min)	150
		In-Stack Sinter Used (Y/N)	Y		

Date of Test	01/07/20255
Sample Start Time	14:53
Sample End Time	15:23
Duration	30
Measured O2	20.90
O2 Uncertainty %Vol	1.25
Meter Start Time	0:00:00
Meter End Time	0:30:00
Meter Elapsed Time	0:30:00
Impinger 1	None Used
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Meter Units: ◉ litres

Sample		Pre-test Leak Check		Post-test Leak Check		Total
Start Volume	0.00	Time	14:48:00	Time	15:24:00	
Final Volume	4.53	Reading (ml/min)	20	Reading (ml/min)	20	
Total Volume	4.52	% Leak	4.4	% Leak	4.4	4.52
Sample Train Internal Volume	0.010	Litres				

Pre and post test leak checks are mandatory. The pump must be set to 450 ml/min during leak checks. Pass rate in CEN TS 13649 is 5%

Sample Point	A1	A1	A1	
Time/ point (mins)	0 - 10	10 - 20	20 - 30	
Tube Temp °C	29	29	29	
Stack Temp °C	30	29	30	
Meter Temp °C	29	29	29	
Pump Flowrate (ml/min)	150	150	150	

Impinger 2	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Sample Point				
Time/ point (mins)				
Tube Temp °C				
Stack Temp °C				
Meter Temp °C				
Pump Flowrate (ml/min)				

Impinger3	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Sample Point				
Time/ point (mins)				
Tube Temp °C				
Stack Temp °C				
Meter Temp °C				
Pump Flowrate (ml/min)				

Silica	(IF USED)
<50% Spent at end Y/N?	Yes
Sample train upstream of sorbent tube condensation free for entire sample (Y/N)	Yes

DEScycle at Leicester University
Permit No : ...
Variation No : ...
Report Ref : P6125 : R001

Installation Name : Reaction Vessel
Visit Details : Investigative Emissions – July 2025
Survey Dates : 1st July 2025
Report Issue Date : 20th August 2025

Environmental Compliance Limited				SAMPLE TUBE DATA SAMPLING PROFORMA (VAPEX ONLY)	
Client	Descycle Ltd	◉ Circular ○ Rectangular ○ Elipse		Vapex Pump ID	1278
Site	Leicester University	Stack Diameter (mm)	45		
Location	Materials Laboratory				
Stack ID	Reaction Vessel	Stack Area (m^2)	0.002		
Test No	Top 20 & Total VOC Test 1	Barometric Pressure (mb)	1006	Meter Yd	0.989
Job No	P6125	Stack Thermocouple ID	1244		
ECL Site Staff	SH & JL	Tube Thermocouple ID	1035		
Barometer ID	1320	Meter Thermocouple ID	1032	Vapex Sampling Rate (ml/min)	150
		In-Stack Sinter Used (Y/N)	Y		

Date of Test	01/07/2025
Sample Start Time	10:20
Sample End Time	10:50
Duration	30
Measured O2	20.90
O2 Uncertainty %Vol	1.25
Meter Start Time	0:00:00
Meter End Time	0:30:00
Meter Elapsed Time	0:30:00
Impinger 1	None Used
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Meter Units: ◉ litres

	Sample	Pre-test Leak Check		Post-test Leak Check		Total
Start Volume	0.00	Time	10:10:00	Time	10:55:00	
Final Volume	4.53	Reading (ml/min)	22	Reading (ml/min)	21	
Total Volume	4.52	% Leak	4.9	% Leak	4.7	4.52
Sample Train Internal Volume	0.010	Litres				

Pre and post test leak checks are mandatory. The pump must be set to 450 ml/min during leak checks. Pass rate in CEN TS 13649 is 5%

Sample Point	A1	A1	A1	
Time/ point (mins)	0 - 10	10 - 20	20 - 30	
Tube Temp °C	25	26	26	
Stack Temp °C	26	26	26	
Meter Temp °C	25	26	26	
Pump Flowrate (ml/min)	150	150	150	

Impinger 2	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Sample Point				
Time/ point (mins)				
Tube Temp °C				
Stack Temp °C				
Meter Temp °C				
Pump Flowrate (ml/min)				

Impinger3	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Sample Point				
Time/ point (mins)				
Tube Temp °C				
Stack Temp °C				
Meter Temp °C				
Pump Flowrate (ml/min)				

Silica	(IF USED)
<50% Spent at end Y/N?	Yes
Sample train upstream of sorbent tube condensation free for entire sample (Y/N)	Yes

Environmental Compliance Limited				SAMPLE TUBE DATA SAMPLING PROFORMA (VAPEX ONLY)	
Client	Descycle Ltd	◉ Circular ○ Rectangular ○ Elipse		Vapex Pump ID	1278
Site	Leicester University	Stack Diameter (mm)	45		
Location	Materials Laboratory				
Stack ID	Reaction Vessel	Stack Area (m^2)	0.002		
Test No	Top 20 & Total VOC Test 2	Barometric Pressure (mb)	1006	Meter Yd	0.989
Job No	P6125	Stack Thermocouple ID	1244		
ECL Site Staff	SH & JL	Tube Thermocouple ID	1035		
Barometer ID	1320	Meter Thermocouple ID	1032	Vapex Sampling Rate (ml/min)	150
		In-Stack Sinter Used (Y/N)	Y		

Date of Test	01/07/2025
Sample Start Time	11:00
Sample End Time	11:30
Duration	30
Measured O2	20.90
O2 Uncertainty %Vol	1.25
Meter Start Time	0:00:00
Meter End Time	0:30:00
Meter Elapsed Time	0:30:00
Impinger 1	None Used
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Meter Units: ◉ litres

	Sample	Pre-test Leak Check		Post-test Leak Check		Total
Start Volume	0.00	Time	10:57:00	Time	11:35:00	
Final Volume	4.53	Reading (ml/min)	20	Reading (ml/min)	20	
Total Volume	4.52	% Leak	4.4	% Leak	4.4	4.52
Sample Train Internal Volume	0.010	Litres				

Pre and post test leak checks are mandatory. The pump must be set to 450 ml/min during leak checks. Pass rate in CEN TS 13649 is 5%

Sample Point	A1	A1	A1	
Time/ point (mins)	0 - 10	10 - 20	20 - 30	
Tube Temp °C	26	26	27	
Stack Temp °C	27	27	27	
Meter Temp °C	26	26	27	
Pump Flowrate (ml/min)	150	150	150	

Impinger 2	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Sample Point				
Time/ point (mins)				
Tube Temp °C				
Stack Temp °C				
Meter Temp °C				
Pump Flowrate (ml/min)				

Impinger3	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Sample Point				
Time/ point (mins)				
Tube Temp °C				
Stack Temp °C				
Meter Temp °C				
Pump Flowrate (ml/min)				

Silica	(IF USED)
<50% Spent at end Y/N?	Yes
Sample train upstream of sorbent tube condensation free for entire sample (Y/N)	Yes

Environmental Compliance Limited

DEScycle at Leicester University		Installation Name	: Reaction Vessel
Permit No	: ...	Visit Details	: Investigative Emissions – July 2025
Variation No	: ...	Survey Dates	: 1st July 2025
Report Ref	: P6125 : R001	Report Issue Date	: 20th August 2025

Environmental Compliance Limited	SAMPLE TUBE DATA SAMPLING PROFORMA (VAPEX ONLY)

Client	Descycle Ltd	◉ Circular ○ Rectangular ○ Elipse		Vapex Pump ID	1278	Date of Test	01/07/2025
Site	Leicester University	Stack Diameter (mm)	45			Sample Start Time	11:40
Location	Materials Laboratory					Sample End Time	12:10
Stack ID	Reaction Vessel	Stack Area (m^2)	0.002			Duration	30
Test No	Top 20 & Total VOC Test 3	Barometric Pressure (mb)	1006	Meter Yd	0.989	Measured O2	20.90
Job No	P6125	Stack Thermocouple ID	1244			O2 Uncertainty %Vol	1.25
ECL Site Staff	SH & JL	Tube Thermocouple ID	1035			Meter Start Time	0:00:00
Barometer ID	1320	Meter Thermocouple ID	1032	Vapex Sampling Rate (ml/min)	150	Meter End Time	0:30:00
		In-Stack Sinter Used (Y/N)	Y			Meter Elapsed Time	0:30:00
						Impinger 1	None Used

Meter Units ◉ litres

	Sample	Pre-test Leak Check		Post-test Leak Check		Total		
Start Volume	0.00	Time	11:36:00	Time	12:13:00		Start Weight (g)	
Final Volume	4.50	Reading (ml/min)	21	Reading (ml/min)	21		End Weight (g)	
Total Volume	4.49	% Leak	4.7	% Leak	4.7	4.49	Total weight (g)	0
Sample Train Internal Volume	0.010	Litres						

Pre and post test leak checks are mandatory. The pump must be set to 450 ml/min during leak checks. Pass rate in CEN TS 13649 is 5%

Sample Point	A1	A1	A1		Impinger 2
Time/ point (mins)	0 - 10	10 - 20	20 - 30		
Tube Temp °C	27	27	27		Start Weight (g)
Stack Temp °C	28	28	28		
Meter Temp °C	27	27	27		End Weight (g)
Pump Flowrate (ml/min)	150	150	150		Total weight (g) 0

Sample Point					Impinger3
Time/ point (mins)					
Tube Temp °C					Start Weight (g)
Stack Temp °C					
Meter Temp °C					End Weight (g)
Pump Flowrate (ml/min)					Total weight (g) 0

Sample Point					Silica (IF USED)
Time/ point (mins)					<50% Spent at end Y/N? Yes
Tube Temp °C					Sample train upstream of sorbent tube condensation free for entire sample (Y/N) Yes
Stack Temp °C					
Meter Temp °C					
Pump Flowrate (ml/min)					

Environmental Compliance Limited	SAMPLE TUBE DATA SAMPLING PROFORMA (VAPEX ONLY)

Client	Descycle Ltd	◉ Circular ○ Rectangular ○ Elipse		Vapex Pump ID	1278	Date of Test	01/07/2025
Site	Leicester University	Stack Diameter (mm)	45			Sample Start Time	13:02
Location	Materials Laboratory					Sample End Time	13:32
Stack ID	Reaction Vessel	Stack Area (m^2)	0.002			Duration	30
Test No	Top 20 & Total VOC Test 4	Barometric Pressure (mb)	1006	Meter Yd	0.989	Measured O2	20.90
Job No	P6125	Stack Thermocouple ID	1244			O2 Uncertainty %Vol	1.25
ECL Site Staff	SH & JL	Tube Thermocouple ID	1035			Meter Start Time	0:00:00
Barometer ID	1320	Meter Thermocouple ID	1032	Vapex Sampling Rate (ml/min)	150	Meter End Time	0:30:00
		In-Stack Sinter Used (Y/N)	Y			Meter Elapsed Time	0:30:00
						Impinger 1	None Used

Meter Units ◉ litres

	Sample	Pre-test Leak Check		Post-test Leak Check		Total		
Start Volume	0.00	Time	12:15:00	Time	13:34:00		Start Weight (g)	
Final Volume	4.51	Reading (ml/min)	19	Reading (ml/min)	20		End Weight (g)	
Total Volume	4.50	% Leak	4.2	% Leak	4.4	4.50	Total weight (g)	0
Sample Train Internal Volume	0.010	Litres						

Pre and post test leak checks are mandatory. The pump must be set to 450 ml/min during leak checks. Pass rate in CEN TS 13649 is 5%

Sample Point	A1	A1	A1		Impinger 2
Time/ point (mins)	0 - 10	10 - 20	20 - 30		
Tube Temp °C	29	29	29		Start Weight (g)
Stack Temp °C	30	30	30		
Meter Temp °C	29	29	29		End Weight (g)
Pump Flowrate (ml/min)	150	150	150		Total weight (g) 0

Sample Point					Impinger3
Time/ point (mins)					
Tube Temp °C					Start Weight (g)
Stack Temp °C					
Meter Temp °C					End Weight (g)
Pump Flowrate (ml/min)					Total weight (g) 0

Sample Point					Silica (IF USED)
Time/ point (mins)					<50% Spent at end Y/N? Yes
Tube Temp °C					Sample train upstream of sorbent tube condensation free for entire sample (Y/N) Yes
Stack Temp °C					
Meter Temp °C					
Pump Flowrate (ml/min)					

DEScycle at Leicester University
Permit No : ...
Variation No : ...
Report Ref : P6125 : R001

Installation Name : Reaction Vessel
Visit Details : Investigative Emissions – July 2025
Survey Dates : 1st July 2025
Report Issue Date : 20th August 2025

Environmental Compliance Limited				SAMPLE TUBE DATA SAMPLING PROFORMA (VAPEX ONLY)	
Client	Descycle Ltd	◉ Circular ○ Rectangular ○ Elipse		Vapex Pump ID	1278
Site	Leicester University	Stack Diameter (mm)	45		
Location	Materials Laboratory				
Stack ID	Reaction Vessel	Stack Area (m^2)	0.002		
Test No	Top 20 & Total VOC Test 5	Barometric Pressure (mb)	1006	Meter Yd	0.989
Job No	P6125	Stack Thermocouple ID	1244		
ECL Site Staff	SH & JL	Tube Thermocouple ID	1035		
Barometer ID	1320	Meter Thermocouple ID	1032	Vapex Sampling Rate (ml/min)	150
		In-Stack Sinter Used (Y/N)	Y		

Date of Test	01/07/2025
Sample Start Time	14:15
Sample End Time	14:45
Duration	30
Measured O2	20.90
O2 Uncertainty %Vol	1.25
Meter Start Time	0:00:00
Meter End Time	0:30:00
Meter Elapsed Time	0:30:00
Impinger 1	None Used
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Meter Units: ◉ litres

Sample		Pre-test Leak Check		Post-test Leak Check		Total
Start Volume	0.00	Time	13:38:00	Time	14:46:00	
Final Volume	4.51	Reading (ml/min)	20	Reading (ml/min)	21	
Total Volume	4.50	% Leak	4.4	% Leak	4.7	4.50
Sample Train Internal Volume	0.010	Litres	Pre and post test leak checks are mandatory. The pump must be set to 450 ml/min during leak checks. Pass rate in CEN TS 13649 is 5%			

Sample Point	A1	A1	A1	
Time/ point (mins)	0 - 10	10 - 20	20 - 30	
Tube Temp °C	29	29	29	
Stack Temp °C	30	29	29	
Meter Temp °C	29	29	29	
Pump Flowrate (ml/min)	150	150	150	

Impinger 2	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Sample Point				
Time/ point (mins)				
Tube Temp °C				
Stack Temp °C				
Meter Temp °C				
Pump Flowrate (ml/min)				

Impinger3	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Sample Point				
Time/ point (mins)				
Tube Temp °C				
Stack Temp °C				
Meter Temp °C				
Pump Flowrate (ml/min)				

Silica	(IF USED)
<50% Spent at end Y/N?	Yes
Sample train upstream of sorbent tube condensation free for entire sample (Y/N)	Yes

Environmental Compliance Limited				SAMPLE TUBE DATA SAMPLING PROFORMA (VAPEX ONLY)	
Client	Descycle Ltd	◉ Circular ○ Rectangular ○ Elipse		Vapex Pump ID	1278
Site	Leicester University	Stack Diameter (mm)	45		
Location	Materials Laboratory				
Stack ID	Reaction Vessel	Stack Area (m^2)	0.002		
Test No	Top 20 & Total VOC Test 6	Barometric Pressure (mb)	1006	Meter Yd	0.989
Job No	P6125	Stack Thermocouple ID	1244		
ECL Site Staff	SH & JL	Tube Thermocouple ID	1035		
Barometer ID	1320	Meter Thermocouple ID	1032	Vapex Sampling Rate (ml/min)	150
		In-Stack Sinter Used (Y/N)	Y		

Date of Test	01/07/2025
Sample Start Time	14:53
Sample End Time	15:23
Duration	30
Measured O2	20.90
O2 Uncertainty %Vol	1.25
Meter Start Time	0:00:00
Meter End Time	0:30:00
Meter Elapsed Time	0:30:00
Impinger 1	None Used
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Meter Units: ◉ litres

Sample		Pre-test Leak Check		Post-test Leak Check		Total
Start Volume	0.00	Time	14:49:00	Time	15:25:00	
Final Volume	4.53	Reading (ml/min)	19	Reading (ml/min)	21	
Total Volume	4.52	% Leak	4.2	% Leak	4.7	4.52
Sample Train Internal Volume	0.010	Litres	Pre and post test leak checks are mandatory. The pump must be set to 450 ml/min during leak checks. Pass rate in CEN TS 13649 is 5%			

Sample Point	A1	A1	A1	
Time/ point (mins)	0 - 10	10 - 20	20 - 30	
Tube Temp °C	29	29	29	
Stack Temp °C	30	29	30	
Meter Temp °C	29	29	29	
Pump Flowrate (ml/min)	150	150	150	

Impinger 2	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Sample Point				
Time/ point (mins)				
Tube Temp °C				
Stack Temp °C				
Meter Temp °C				
Pump Flowrate (ml/min)				

Impinger3	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Sample Point				
Time/ point (mins)				
Tube Temp °C				
Stack Temp °C				
Meter Temp °C				
Pump Flowrate (ml/min)				

Silica	(IF USED)
<50% Spent at end Y/N?	Yes
Sample train upstream of sorbent tube condensation free for entire sample (Y/N)	Yes

Environmental Compliance Limited

DEScycle at Leicester University		Installation Name	: Reaction Vessel
Permit No	: ...	Visit Details	: Investigative Emissions – July 2025
Variation No	: ...	Survey Dates	: 1st July 2025
Report Ref	: P6125 : R001	Report Issue Date	: 20th August 2025

Environmental Compliance Limited	SAMPLE TUBE DATA SAMPLING PROFORMA (VAPEX ONLY)

Client	Descycle Ltd	◉ Circular ○ Rectangular ○ Elipse		Vapex Pump ID	1277	Date of Test	01/07/2025
Site	Leicester University	Stack Diameter (mm)	45			Sample Start Time	10:20
Location	Materials Laboratory					Sample End Time	10:50
Stack ID	Reaction Vessel	Stack Area (m^2)	0.002			Duration	30
Test No	Acids Screen Test 1	Barometric Pressure (mb)	1006	Meter Yd	0.996	Measured O2	20.90
Job No	P6125	Stack Thermocouple ID	1244			O2 Uncertainty %Vol	1.25
ECL Site Staff	SH & JL	Tube Thermocouple ID	1033			Meter Start Time	0:00:00
Barometer ID	1320	Meter Thermocouple ID	1028	Vapex Sampling Rate (ml/min)	150	Meter End Time	0:30:00
		In-Stack Sinter Used (Y/N)	Y			Meter Elapsed Time	0:30:00

Meter Units ◉ litres

	Sample	Pre-test Leak Check		Post-test Leak Check		Total
Start Volume	0.00	Time	10:05:00	Time	10:52:00	
Final Volume	4.52	Reading (ml/min)	21	Reading (ml/min)	22	
Total Volume	4.51	% Leak	4.7	% Leak	4.9	4.51
Sample Train Internal Volume	0.010	Litres				

Pre and post test leak checks are mandatory. The pump must be set to 450 ml/min during leak checks. Pass rate in CEN TS 13649 is 5%

Sample Point	A1	A1	A1		
Time/ point (mins)	0 - 10	10 - 20	20 - 30		
Tube Temp °C	25	26	26		
Stack Temp °C	26	26	26		
Meter Temp °C	25	26	26		
Pump Flowrate (ml/min)	150	150	150		

Sample Point					
Time/ point (mins)					
Tube Temp °C					
Stack Temp °C					
Meter Temp °C					
Pump Flowrate (ml/min)					

Sample Point					
Time/ point (mins)					
Tube Temp °C					
Stack Temp °C					
Meter Temp °C					
Pump Flowrate (ml/min)					

Impinger 1	None Used
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Impinger 2	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Impinger3	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Silica	(IF USED)
<50% Spent at end Y/N?	Yes
Sample train upstream of sorbent tube condensation free for entire sample (Y/N)	Yes

Environmental Compliance Limited	SAMPLE TUBE DATA SAMPLING PROFORMA (VAPEX ONLY)

Client	Descycle Ltd	◉ Circular ○ Rectangular ○ Elipse		Vapex Pump ID	1277	Date of Test	01/07/2025
Site	Leicester University	Stack Diameter (mm)	45			Sample Start Time	11:05
Location	Materials Laboratory					Sample End Time	11:35
Stack ID	Reaction Vessel	Stack Area (m^2)	0.002			Duration	30
Test No	Acids Screen Test 2	Barometric Pressure (mb)	1006	Meter Yd	0.996	Measured O2	20.90
Job No	P6125	Stack Thermocouple ID	1244			O2 Uncertainty %Vol	1.25
ECL Site Staff	SH & JL	Tube Thermocouple ID	1033			Meter Start Time	0:00:00
Barometer ID	1320	Meter Thermocouple ID	1028	Vapex Sampling Rate (ml/min)	150	Meter End Time	0:30:00
		In-Stack Sinter Used (Y/N)	Y			Meter Elapsed Time	0:30:00

Meter Units ◉ litres

	Sample	Pre-test Leak Check		Post-test Leak Check		Total
Start Volume	0.00	Time	10:58:00	Time	11:37:00	
Final Volume	4.43	Reading (ml/min)	20	Reading (ml/min)	19	
Total Volume	4.42	% Leak	4.4	% Leak	4.2	4.42
Sample Train Internal Volume	0.010	Litres				

Pre and post test leak checks are mandatory. The pump must be set to 450 ml/min during leak checks. Pass rate in CEN TS 13649 is 5%

Sample Point	A1	A1	A1		
Time/ point (mins)	0 - 10	10 - 20	20 - 30		
Tube Temp °C	26	26	27		
Stack Temp °C	27	27	27		
Meter Temp °C	26	26	27		
Pump Flowrate (ml/min)	150	150	150		

Sample Point					
Time/ point (mins)					
Tube Temp °C					
Stack Temp °C					
Meter Temp °C					
Pump Flowrate (ml/min)					

Sample Point					
Time/ point (mins)					
Tube Temp °C					
Stack Temp °C					
Meter Temp °C					
Pump Flowrate (ml/min)					

Impinger 1	None Used
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Impinger 2	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Impinger3	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Silica	(IF USED)
<50% Spent at end Y/N?	Yes
Sample train upstream of sorbent tube condensation free for entire sample (Y/N)	Yes

Environmental Compliance Limited

DEScycle at Leicester University — Installation Name : Reaction Vessel
Permit No : ... — Visit Details : Investigative Emissions – July 2025
Variation No : ... — Survey Dates : 1st July 2025
Report Ref : P6125 : R001 — Report Issue Date : 20th August 2025

Environmental Compliance Limited	SAMPLE TUBE DATA SAMPLING PROFORMA (VAPEX ONLY)

Client	Descycle Ltd	◉ Circular ○ Rectangular	○ Elipse	Vapex Pump ID	1277	Date of Test	01/07/2025
Site	Leicester University	Stack Diameter (mm)	45			Sample Start Time	11:40
Location	Materials Laboratory					Sample End Time	12:10
Stack ID	Reaction Vessel	Stack Area (m^2)	0.002			Duration	30
Test No	Acids Screen Test 3	Barometric Pressure (mb)	1006	Meter Yd	0.996	Measured O2	20.90
Job No	P6125	Stack Thermocouple ID	1244			O2 Uncertainty %Vol	1.25
ECL Site Staff	SH & JL	Tube Thermocouple ID	1033			Meter Start Time	0:00:00
Barometer ID	1320	Meter Thermocouple ID	1028	Vapex Sampling Rate (ml/min)	150	Meter End Time	0:30:00
		In-Stack Sinter Used (Y/N)	Y			Meter Elapsed Time	0:30:00
						Impinger 1	None Used

Meter Units: ◉ litres

	Sample	Pre-test Leak Check		Post-test Leak Check		Total		
Start Volume	0.00	Time	11:38:00	Time	12:14:00		Start Weight (g)	
Final Volume	4.51	Reading (ml/min)	21	Reading (ml/min)	20		End Weight (g)	
Total Volume	4.50	% Leak	4.7	% Leak	4.4	4.50	Total weight (g)	0
Sample Train Internal Volume	0.010	Litres						

Pre and post test leak checks are mandatory. The pump must be set to 450 ml/min during leak checks. Pass rate in CEN TS 13649 is 5%

Sample Point	A1	A1	A1		Impinger 2	
Time/ point (mins)	0 - 10	10 - 20	20 - 30			
Tube Temp °C	27	27	27		Start Weight (g)	
Stack Temp °C	28	28	28			
Meter Temp °C	27	27	27		End Weight (g)	
Pump Flowrate (ml/min)	150	150	150		Total weight (g)	0

Sample Point					Impinger3	
Time/ point (mins)						
Tube Temp °C					Start Weight (g)	
Stack Temp °C						
Meter Temp °C					End Weight (g)	
Pump Flowrate (ml/min)					Total weight (g)	0

Sample Point					Silica	(IF USED)
Time/ point (mins)					<50% Spent at end Y/N?	Yes
Tube Temp °C					Sample train upstream of sorbent tube condensation free for entire sample (Y/N)	Yes
Stack Temp °C						
Meter Temp °C						
Pump Flowrate (ml/min)						

Environmental Compliance Limited	SAMPLE TUBE DATA SAMPLING PROFORMA (VAPEX ONLY)

Client	Descycle Ltd	◉ Circular ○ Rectangular	○ Elipse	Vapex Pump ID	1277	Date of Test	01/07/2025
Site	Leicester University	Stack Diameter (mm)	45			Sample Start Time	13:02
Location	Materials Laboratory					Sample End Time	13:32
Stack ID	Reaction Vessel	Stack Area (m^2)	0.002			Duration	30
Test No	Acids Screen Test 4	Barometric Pressure (mb)	1006	Meter Yd	0.996	Measured O2	20.90
Job No	P6125	Stack Thermocouple ID	1244			O2 Uncertainty %Vol	1.25
ECL Site Staff	SH & JL	Tube Thermocouple ID	1033			Meter Start Time	0:00:00
Barometer ID	1320	Meter Thermocouple ID	1028	Vapex Sampling Rate (ml/min)	150	Meter End Time	0:30:00
		In-Stack Sinter Used (Y/N)	Y			Meter Elapsed Time	0:30:00
						Impinger 1	None Used

Meter Units: ◉ litres

	Sample	Pre-test Leak Check		Post-test Leak Check		Total		
Start Volume	0.00	Time	12:16:00	Time	13:34:00		Start Weight (g)	
Final Volume	4.51	Reading (ml/min)	20	Reading (ml/min)	20		End Weight (g)	
Total Volume	4.50	% Leak	4.4	% Leak	4.4	4.50	Total weight (g)	0
Sample Train Internal Volume	0.010	Litres						

Pre and post test leak checks are mandatory. The pump must be set to 450 ml/min during leak checks. Pass rate in CEN TS 13649 is 5%

Sample Point	A1	A1	A1		Impinger 2	
Time/ point (mins)	0 - 10	10 - 20	20 - 30			
Tube Temp °C	29	29	29		Start Weight (g)	
Stack Temp °C	30	30	30			
Meter Temp °C	29	29	29		End Weight (g)	
Pump Flowrate (ml/min)	150	150	150		Total weight (g)	0

Sample Point					Impinger3	
Time/ point (mins)						
Tube Temp °C					Start Weight (g)	
Stack Temp °C						
Meter Temp °C					End Weight (g)	
Pump Flowrate (ml/min)					Total weight (g)	0

Sample Point					Silica	(IF USED)
Time/ point (mins)					<50% Spent at end Y/N?	Yes
Tube Temp °C					Sample train upstream of sorbent tube condensation free for entire sample (Y/N)	Yes
Stack Temp °C						
Meter Temp °C						
Pump Flowrate (ml/min)						

Environmental Compliance Limited

DEScycle at Leicester University
Permit No : ...
Variation No : ...
Report Ref : P6125 : R001

Installation Name : Reaction Vessel
Visit Details : Investigative Emissions – July 2025
Survey Dates : 1st July 2025
Report Issue Date : 20th August 2025

Environmental Compliance Limited				SAMPLE TUBE DATA SAMPLING PROFORMA (VAPEX ONLY)	
Client	Descycle Ltd	◉ Circular ○ Rectangular ○ Elipse		Vapex Pump ID	1277
Site	Leicester University	Stack Diameter (mm)	45		
Location	Materials Laboratory				
Stack ID	Reaction Vessel	Stack Area (m^2)	0.002		
Test No	Acids Screen Test 5	Barometric Pressure (mb)	1006	Meter Yd	0.996
Job No	P6125	Stack Thermocouple ID	1244		
ECL Site Staff	SH & JL	Tube Thermocouple ID	1033		
Barometer ID	1320	Meter Thermocouple ID	1028	Vapex Sampling Rate (ml/min)	150
		In-Stack Sinter Used (Y/N)	Y		

Date of Test	01/07/2025
Sample Start Time	14:15
Sample End Time	14:45
Duration	30
Measured O2	20.90
O2 Uncertainty %Vol	1.25
Meter Start Time	0:00:00
Meter End Time	0:30:00
Meter Elapsed Time	0:30:00
Impinger 1	None Used
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Meter Units: ◉ litres

Sample		Pre-test Leak Check		Post-test Leak Check		Total
Start Volume	0.00	Time	13:40:00	Time	14:47:00	
Final Volume	4.51	Reading (ml/min)	21	Reading (ml/min)	20	
Total Volume	4.50	% Leak	4.7	% Leak	4.4	4.50
Sample Train Internal Volume	0.010	Litres				

Pre and post test leak checks are mandatory. The pump must be set to 450 ml/min during leak checks. Pass rate in CEN TS 13649 is 5%

Sample Point	A1	A1	A1	
Time/ point (mins)	0 - 10	10 - 20	20 - 30	
Tube Temp °C	29	29	29	
Stack Temp °C	30	29	29	
Meter Temp °C	29	29	29	
Pump Flowrate (ml/min)	150	150	150	

Impinger 2	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Sample Point				
Time/ point (mins)				
Tube Temp °C				
Stack Temp °C				
Meter Temp °C				
Pump Flowrate (ml/min)				

Impinger3	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Sample Point				
Time/ point (mins)				
Tube Temp °C				
Stack Temp °C				
Meter Temp °C				
Pump Flowrate (ml/min)				

Silica	(IF USED)
<50% Spent at end Y/N?	Yes
Sample train upstream of sorbent tube condensation free for entire sample (Y/N)	Yes

Environmental Compliance Limited				SAMPLE TUBE DATA SAMPLING PROFORMA (VAPEX ONLY)	
Client	Descycle Ltd	◉ Circular ○ Rectangular ○ Elipse		Vapex Pump ID	1277
Site	Leicester University	Stack Diameter (mm)	45		
Location	Materials Laboratory				
Stack ID	Reaction Vessel	Stack Area (m^2)	0.002		
Test No	Acids Screen Test 6	Barometric Pressure (mb)	1006	Meter Yd	0.996
Job No	P6125	Stack Thermocouple ID	1244		
ECL Site Staff	SH & JL	Tube Thermocouple ID	1033		
Barometer ID	1320	Meter Thermocouple ID	1028	Vapex Sampling Rate (ml/min)	150
		In-Stack Sinter Used (Y/N)	Y		

Date of Test	01/07/2025
Sample Start Time	14:53
Sample End Time	15:23
Duration	30
Measured O2	20.90
O2 Uncertainty %Vol	1.25
Meter Start Time	0:00:00
Meter End Time	0:30:00
Meter Elapsed Time	0:30:00
Impinger 1	None Used
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Meter Units: ◉ litres

Sample		Pre-test Leak Check		Post-test Leak Check		Total
Start Volume	0.00	Time	14:49:00	Time	15:26:00	
Final Volume	4.53	Reading (ml/min)	21	Reading (ml/min)	20	
Total Volume	4.52	% Leak	4.7	% Leak	4.4	4.52
Sample Train Internal Volume	0.010	Litres				

Pre and post test leak checks are mandatory. The pump must be set to 450 ml/min during leak checks. Pass rate in CEN TS 13649 is 5%

Sample Point	A1	A1	A1	
Time/ point (mins)	0 - 10	10 - 20	20 - 30	
Tube Temp °C	29	29	29	
Stack Temp °C	30	29	30	
Meter Temp °C	29	29	29	
Pump Flowrate (ml/min)	150	150	150	

Impinger 2	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Sample Point				
Time/ point (mins)				
Tube Temp °C				
Stack Temp °C				
Meter Temp °C				
Pump Flowrate (ml/min)				

Impinger3	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Sample Point				
Time/ point (mins)				
Tube Temp °C				
Stack Temp °C				
Meter Temp °C				
Pump Flowrate (ml/min)				

Silica	(IF USED)
<50% Spent at end Y/N?	Yes
Sample train upstream of sorbent tube condensation free for entire sample (Y/N)	Yes

LABORATORY ANALYSIS RESULTS

Laboratory analysis was subcontracted to RPS laboratories, a UKAS Accredited Testing Laboratory, Number 0605.

RPS holds UKAS & MCERTS accreditation for some of this analysis but not others.

As required by the MCERTS Performance Standard for Organisations, the analysis results are shown below.

The accreditation status of each analysis result is also shown below, with the following key code

UM = UKAS & MCERTS accredited.
U = UKAS but NOT MCERTS accredited.
N = No accreditation held.

Environmental Compliance Limited

DEScycle at Leicester University
Permit No : ...
Variation No : ...
Report Ref : P6125 : R001

Installation Name : Reaction Vessel
Visit Details : Investigative Emissions – July 2025
Survey Dates : 1st July 2025
Report Issue Date : 20th August 2025

Customer Sample No	ECL/25/2906	ECL/25/2907	ECL/25/2908	ECL/25/2909	ECL/25/2910	ECL/25/2911	ECL/25/2912
RPS Sample No	310536	310537	310538	310539	310540	310541	310542
Sample Matrix	TUBE	TUBE	TUBE	TUBE	TUBE	TUBE	TUBE
Sampling Date	01/07/2025	01/07/2025	01/07/2025	01/07/2025	01/07/2025	01/07/2025	01/07/2025

Determinand	CAS No	Codes	SOP	RL	Units							
formaldehyde FRONT	50-00-0	UM	A40	0.1	ug	0.3	0.3	0.3	0.3	0.5	0.5	0.1
butyraldehyde FRONT	123-72-8	UM	A40	0.2	ug	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
acetaldehyde FRONT	75-07-0	UM	A40	0.1	ug	0.2	< 0.1	2.8	0.7	3.7	3.3	< 0.1
propionaldehyde FRONT	123-38-6	UM	A40	0.2	ug	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
benzaldehyde FRONT	100-52-7	UM	A40	0.2	ug	< 0.2	< 0.2	0.2	< 0.2	0.2	< 0.2	< 0.2
valeraldehyde FRONT	110-62-3	UM	A40	0.2	ug	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
hexanal FRONT	66-25-1	UM	A40	0.2	ug	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
heptanal FRONT	111-71-7	N	A40	0.2	ug	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
formaldehyde BACK	50-00-0	UM	A40	0.1	ug	0.1	0.1	< 0.1	< 0.1	0.1	0.1	< 0.1
butyraldehyde BACK	123-72-8	UM	A40	0.2	ug	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
acetaldehyde BACK	75-07-0	UM	A40	0.1	ug	< 0.1	< 0.1	< 0.1	< 0.1	0.6	0.2	< 0.1
propionaldehyde BACK	123-38-6	UM	A40	0.2	ug	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
benzaldehyde BACK	100-52-7	UM	A40	0.2	ug	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
valeraldehyde BACK	110-62-3	UM	A40	0.2	ug	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
hexanal BACK	66-25-1	UM	A40	0.2	ug	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
heptanal BACK	111-71-7	N	A40	0.2	ug	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2

DEScycle at Leicester University
Permit No : ...
Variation No : ...
Report Ref : P6125 : R001

Installation Name : Reaction Vessel
Visit Details : Investigative Emissions – July 2025
Survey Dates : 1st July 2025
Report Issue Date : 20th August 2025

Customer Sample No	ECL/25/2913	ECL/25/2914	ECL/25/2915	ECL/25/2916	ECL/25/2917	ECL/25/2918	ECL/25/2919
RPS Sample No	310556	310557	310558	310559	310560	310561	310562
Sample Matrix	TUBE	TUBE	TUBE	TUBE	TUBE	TUBE	TUBE
Sampling Date	01/07/2025	01/07/2025	01/07/2025	01/07/2025	01/07/2025	01/07/2025	01/07/2025

Determinand	CAS No	Codes	SOP	RL	Units							
hydrofluoric acid	7664-39-3	N	C27	5	ug	< 5	< 5	< 5	< 5	< 5	< 5	< 5
hydrochloric acid	7647-01-0	U	C27	1	ug	< 1	< 1	< 1	< 1	< 1	< 1	< 1
nitric acid	7697-37-2	U	C27	2	ug	< 2	< 2	< 2	< 2	< 2	< 2	< 2
phosphoric acid	7664-38-2	U	C27	6	ug	< 6	< 6	< 6	< 6	< 6	< 6	< 6
sulphuric acid	7664-93-9	U	C27	2	ug	< 2	< 2	< 2	< 2	< 2	< 2	< 2
hydrogen bromide	10035-10-6	U	C27	2	ug	< 2	< 2	< 2	< 2	< 2	< 2	< 2

Customer Sample No	ECL/25/2899	ECL/25/2900	ECL/25/2901	ECL/25/2902	ECL/25/2903	ECL/25/2904	ECL/25/2905
RPS Sample No	310529	310530	310531	310532	310533	310534	310535
Sample Matrix	TUBE	TUBE	TUBE	TUBE	TUBE	TUBE	TUBE
Sampling Date	01/07/2025	01/07/2025	01/07/2025	01/07/2025	01/07/2025	01/07/2025	01/07/2025

Determinand	CAS No	Codes	SOP	RL	Units							
total hydrocarbons FRONT		N	M104	10	ug	< 10	< 10	< 10	< 10	30	32	< 10
total hydrocarbons BACK		N	M104	10	ug	< 10	< 10	< 10	< 10	26	< 10	< 10
GC-MS screen (20) FRONT		N	M109	5	ug	S/C	S/C	S/C	S/C	S/C	S/C	S/C
GC-MS screen (20) BACK		N	M109	5	ug	S/C	S/C	S/C	S/C	S/C	S/C	S/C

S/C – See comments on next page

DEScycle at Leicester University			Installation Name	: Reaction Vessel
Permit No	: ...		Visit Details	: Investigative Emissions – July 2025
Variation No	: ...		Survey Dates	: 1st July 2025
Report Ref	: P6125	: R001	Report Issue Date	: 20th August 2025

Comments

Report No.: 25-05624-1

Customer Reference: 2025 Stack Preferential Rates

Customer Order No: E2570 P6125

RPS Sample Number	Customer Number	Sample Comments
310529	ECL/25/2899	VOC Screen Front: VOCs <5µg Back: VOCs <5µg
310530	ECL/25/2900	VOC Screen Front: VOCs <5µg Back: VOCs <5µg
310531	ECL/25/2901	VOC Screen Front: VOCs <5µg Back: VOCs <5µg
310532	ECL/25/2902	VOC Screen Front: VOCs <5µg Back: VOCs <5µg
310533	ECL/25/2903	VOC Screen Front: Acetone 27.5µg Back: Acetone 23.4µg
310534	ECL/25/2904	VOC Screen Front: Acetone 26.7µg Back: VOCs <5µg
310535	ECL/25/2905	VOC Screen Front: VOCs <5µg Back: VOCs <5µg

UNCERTAINTY CALCULATIONS

DEScycle at Leicester University			Installation Name	: Reaction Vessel
Permit No	: ...		Visit Details	: Investigative Emissions – July 2025
Variation No	: ...		Survey Dates	: 1st July 2025
Report Ref	: P6125	: R001	Report Issue Date	: 20th August 2025

Flowrate Uncertainty – Reaction Phase 1

Stack Reference Reaction Vessel

Measurement Uncertainty Calculations - Velocity at Stack Conditions

Contribution From	Standard u/c (Pa)	
Pitot Calibration Uncertainty Contribution	0.01	A
Manometer Calibration Uncertainty Contribution	0.010833333	B
Variation in Actual Pitot reading at sample points	0.05	C
Combined u/c (Pa) =	**Combined u/c (Pa)**	
SQRT $(A/\sqrt{3})^2 + (B/\sqrt{3})^2 + (C/\sqrt{3})^2$	0.03	
Expanded Uncertainty of Flow Measurements Pa	**0.06**	
	Standard u/c (K)	
Temperature Calibration (K)	1.50	D
Variation in Actual Temp reading at sample points	0.00	E
Combined u/c of Temp (K)	**Combined u/c (K)**	
SQRT $((D/\sqrt{3^2}) + (E/\sqrt{3})^2)$	0.86	
Expanded Uncertainty of Temp Measurements (K)	**1.73**	
Measured Average Velocity (m/s) at Stack Conds	1.91	
Maximum Average Velocity (m/s) at Stack Conds	1.94	
Standard Uncertainty Velocity at Stack Conditions (%)	1.68	
Expanded Uncertainty Velocity (at Stack Conditions)	**3.35 (%)**	

Measurement Uncertainty Calculations - Flowrate at Stack Conditions

Contribution From	Standard u/c (m^2)
Area (m2)	0.00002
Measured Average Flowrate (m^3/s) at Stack Conds	0.00
Maximum Average Flowrate (m^3/s) at Stack Conds	0.00
Standard Uncertainty Flowrate (m^3/s) at Stack Conditions (%)	2.69
Expanded Uncertainty Flowrate (m^3/s) at Stack Conditions	**5.39 (%)**

Measurement Uncertainty Calculations - Flowrate at STP & Wet Gas

Contribution From	Standard u/c (%)
Temperature Calibration (K)	0.5
Barometer Calibration	0.5
Measured Average Flowrate (m^3/s) at STP Wet	0.00
Maximum Average Flowrate (m^3/s) at STP Wet	0.00
Standard Uncertainty Flowrate (m^3/s) at STP Wet	3.16
Expanded Uncertainty Flowrate (m^3/s) at STP Wet	**6.32 (%)**

DEScycle at Leicester University			Installation Name	: Reaction Vessel
Permit No	: ...		Visit Details	: Investigative Emissions – July 2025
Variation No	: ...		Survey Dates	: 1st July 2025
Report Ref	: P6125	: R001	Report Issue Date	: 20th August 2025

Flowrate Uncertainty – Reaction Phase 2

Stack Reference Reaction Vessel

Measurement Uncertainty Calculations - Velocity at Stack Conditions

Contribution From	Standard u/c (Pa)	
Pitot Calibration Uncertainty Contribution	0.02	A
Manometer Calibration Uncertainty Contribution	0.022666667	B
Variation in Actual Pitot reading at sample points	0.05	C
Combined u/c (Pa) =	**Combined u/c (Pa)**	
SQRT $(A/\sqrt{3})^2 + (B/\sqrt{3})^2 + (C/\sqrt{3})^2$	0.03	
Expanded Uncertainty of Flow Measurements Pa	**0.07**	
	Standard u/c (K)	
Temperature Calibration (K)	1.51	D
Variation in Actual Temp reading at sample points	0.05	E
Combined u/c of Temp (K)	**Combined u/c (K)**	
SQRT $((D/\sqrt{3^2}) + (E/\sqrt{3})^2)$	0.87	
Expanded Uncertainty of Temp Measurements (K)	**1.74**	
Measured Average Velocity (m/s) at Stack Conds	2.77	
Maximum Average Velocity (m/s) at Stack Conds	2.80	
Standard Uncertainty Velocity at Stack Conditions (%)	1.04	
Expanded Uncertainty Velocity (at Stack Conditions)	**2.09 (%)**	

Measurement Uncertainty Calculations - Flowrate at Stack Conditions

Contribution From	Standard u/c (m^2)
Area (m2)	0.00002
Measured Average Flowrate (m^3/s) at Stack Conds	0.00
Maximum Average Flowrate (m^3/s) at Stack Conds	0.00
Standard Uncertainty Flowrate (m^3/s) at Stack Conditions (%)	2.05
Expanded Uncertainty Flowrate (m^3/s) at Stack Conditions	**4.11 (%)**

Measurement Uncertainty Calculations - Flowrate at STP & Wet Gas

Contribution From	Standard u/c (%)
Temperature Calibration (K)	0.5
Barometer Calibration	0.5
Measured Average Flowrate (m^3/s) at STP Wet	0.00
Maximum Average Flowrate (m^3/s) at STP Wet	0.00
Standard Uncertainty Flowrate (m^3/s) at STP Wet	2.52
Expanded Uncertainty Flowrate (m^3/s) at STP Wet	**5.03 (%)**

DEScycle at Leicester University			Installation Name	: Reaction Vessel
Permit No	: ...		Visit Details	: Investigative Emissions – July 2025
Variation No	: ...		Survey Dates	: 1st July 2025
Report Ref	: P6125	: R001	Report Issue Date	: 20th August 2025

Flowrate Uncertainty – Reaction Phase 3

Stack Reference Reaction Vessel

Measurement Uncertainty Calculations - Velocity at Stack Conditions

Contribution From	Standard u/c (Pa)	
Pitot Calibration Uncertainty Contribution	0.03	A
Manometer Calibration Uncertainty Contribution	0.026833333	B
Variation in Actual Pitot reading at sample points	0.25	C
Combined u/c (Pa) =	**Combined u/c (Pa)**	
SQRT $(A/\sqrt{3})^2 + (B/\sqrt{3})^2 + (C/\sqrt{3})^2$	0.15	
Expanded Uncertainty of Flow Measurements Pa	**0.29**	
	Standard u/c (K)	
Temperature Calibration (K)	1.51	D
Variation in Actual Temp reading at sample points	0.15	E
Combined u/c of Temp (K)	**Combined u/c (K)**	
SQRT $((D/\sqrt{3^2}) + (E/\sqrt{3})^2)$	0.88	
Expanded Uncertainty of Temp Measurements (K)	**1.76**	
Measured Average Velocity (m/s) at Stack Conds	3.02	
Maximum Average Velocity (m/s) at Stack Conds	3.11	
Standard Uncertainty Velocity at Stack Conditions (%)	2.98	
Expanded Uncertainty Velocity (at Stack Conditions)	**5.96 (%)**	

Measurement Uncertainty Calculations - Flowrate at Stack Conditions

Contribution From	Standard u/c (m^2)
Area (m2)	0.00002
Measured Average Flowrate (m^3/s) at Stack Conds	0.00
Maximum Average Flowrate (m^3/s) at Stack Conds	0.00
Standard Uncertainty Flowrate (m^3/s) at Stack Conditions (%)	4.01
Expanded Uncertainty Flowrate (m^3/s) at Stack Conditions	**8.02 (%)**

Measurement Uncertainty Calculations - Flowrate at STP & Wet Gas

Contribution From	Standard u/c (%)
Temperature Calibration (K)	0.5
Barometer Calibration	0.5
Measured Average Flowrate (m^3/s) at STP Wet	0.00
Maximum Average Flowrate (m^3/s) at STP Wet	0.00
Standard Uncertainty Flowrate (m^3/s) at STP Wet	4.48
Expanded Uncertainty Flowrate (m^3/s) at STP Wet	**8.96 (%)**

DEScycle at Leicester University | Installation Name : Reaction Vessel
Permit No : ... | Visit Details : Investigative Emissions – July 2025
Variation No : ... | Survey Dates : 1st July 2025
Report Ref : P6125 : R001 | Report Issue Date : 20th August 2025

Aldehydes Uncertainty – Reaction Phase 1 – Test 1

Site: Descycle Ltd, Leicester University
Location: Materials Laboratory , Stack ID:Reaction Vessel

				Standard Uncertainty @ 95%		
Sampled Volume	V_m	0.00453	m^3	uV_m	0.0001	m^3
Meter Correction Factor or ml/count	Yd	0.994	...	...	...	...
Meter Temperature	T_m	298.67	k	uT_m	1.5	k
Barometric Pressure	ρ_b	1006.00	mBar		10.0	mBar
Oxygen content	$O_{2,m}$	20.90	%Vol	$uO_{2,m}$	1.25	%Vol
Moisture	H_2O	0.00	%Vol	uH_2O		%Vol

Tubes				
Determinand	Recovered Mass		Standard Uncertainty	
Formaldehyde	0.40	µg	uM	0.10 µg
Butyraldehyde	0.20	µg	uM	0.10 µg
Acetaldehyde	0.20	µg	uM	0.0600 µg
Propionaldehyde	0.20	µg	uM	0.10 µg
Benzaldehyde	0.20	µg	uM	0.10 µg
Valeraldehyde	0.20	µg	uM	0.10 µg
Hexanal	0.20	µg	uM	0.10 µg
Heptanal	0.10	µg	uM	0.0500 µg

Note: In the following calculations, the sensitivity coefficient (C) is estimated using $C_i = \frac{\partial f}{\partial x_i}$

For each factor, uncertainty is then calculated by $C_i u_i$ where C is the sensitivity coefficient, u is the standard uncertainty and i is the index identifying the contributing factor e.g. i=uV_m, uT_m etc.

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = \quad 1.00$$

Uncertainty in correction factor to STP due to measured barometric pressure uncertainty component (upb), measured temperature of dry gas uncertainty component (uT_m) & measured moisture (uH_2O)

$$f_s = \frac{273}{T_m} \times \frac{\rho}{101.3} = \quad 0.91$$

	Maximum	Minimum	Sensitivity	ufstp
up_b	0.48	0.47	0.000471	0.00471
uT_m	0.91	0.90	0.00304	0.00456
uH_2O	...	...	...	...

$$\frac{uf_s}{f_s} = \sqrt{\left(\frac{uP_b}{(P_b/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{100/(100 - H_2O)}\right)^2} = \quad 0.00574$$

Uncertainty in volume @ STP due to volume correction factor uncertainty component (uVstd) & volume uncertainty component (uVm)

$$V_{std} = V_{measured} \times f_s = \quad 0.00409$$

	Maximum m^3	Minimum m^3	Sensitivity	Standard Uncertainty m^3
Effect of uf_s	0.00411	0.00406	0.00450	0.0000258
Effect of uV_m	0.00419	0.00399	0.90	0.000102

$$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uf_s}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = \quad 0.0000940$$

Uncertainty of correction factor to reference conditions (excluding oxygen contribution) & Uncertainty in final measurement @ reference conditions due to uncertainty component arrising from leak and/or loss (assumed 2% max) in the sample system (uL)

$$uL = \frac{Conc \times \frac{2}{100}}{\sqrt{3}}$$

	Tubes uL mg/Nm³	Condensate uL mg/Nm³
Formaldehyde	0.00113	...
Butyraldehyde	0.000565	...
Acetaldehyde	0.000565	...
Propionaldehyde	0.000565	...
Benzaldehyde	0.000565	...
Valeraldehyde	0.000565	...
Hexanal	0.000565	...
Heptanal	0.000282	...

$$Conc = \frac{M_{Recovered}}{V_m \times f_s \times f_{O_2}}$$

Uncertainty in final measurement @ Reference Conditions due to $uM_{Recovered}$

Charcoal Tube Results				
	Maximum mg/Nm³	Minimum mg/Nm³	Sensitivity	Standard Uncertainty mg/Nm³
Formaldehyde	0.12	0.0734	244.65	0.0245
Butyraldehyde	0.0734	0.0245	244.65	0.0245
Acetaldehyde	0.0636	0.0343	244.65	0.0147
Propionaldehyde	0.0734	0.0245	244.65	0.0245
Benzaldehyde	0.0734	0.0245	244.65	0.0245
Valeraldehyde	0.0734	0.0245	244.65	0.0245
Hexanal	0.0734	0.0245	244.65	0.0245
Heptanal	0.0367	0.0122	244.65	0.0122

Condensate Results				
	Maximum mg/Nm³	Minimum mg/Nm³	Sensitivity	Standard Uncertainty mg/Nm³
Formaldehyde				
Butyraldehyde				
Acetaldehyde				
Propionaldehyde				
Benzaldehyde				
Valeraldehyde				
Hexanal				
Heptanal				

Uncertainty in final measurement @ Reference Conditions due to uV_{STD}

Charcoal Tube Results				
	Maximum mg/Nm³	Minimum mg/Nm³	Sensitivity	Standard Uncertainty mg/Nm³
Formaldehyde	0.10	0.0957	23.95	0.00225
Butyraldehyde	0.0501	0.0478	11.98	0.00113
Acetaldehyde	0.0501	0.0478	11.98	0.00113
Propionaldehyde	0.0501	0.0478	11.98	0.00113
Benzaldehyde	0.0501	0.0478	11.98	0.00113
Valeraldehyde	0.0501	0.0478	11.98	0.00113
Hexanal	0.0501	0.0478	11.98	0.00113
Heptanal	0.0250	0.0239	5.99	0.000563

Combined Uncertainty (excluding Oxygen contribution)

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{stp})^2}$$

Charcoal Tubes: Determinand	Combined Uncertainty mg/Nm³	Expanded Uncertainty mg/Nm³	Measured Concentration mg/Nm³	Percent of Measured Concentration
Formaldehyde	0.0246	0.0492	0.0979	50.26
Butyraldehyde	0.0245	0.0490	0.0489	100.13
Acetaldehyde	0.0147	0.0295	0.0489	60.22
Propionaldehyde	0.0245	0.0490	0.0489	100.13
Benzaldehyde	0.0245	0.0490	0.0489	100.13
Valeraldehyde	0.0245	0.0490	0.0489	100.13
Hexanal	0.0245	0.0490	0.0489	100.13
Heptanal	0.0122	0.0245	0.0245	100.13

DEScycle at Leicester University | **Installation Name** : Reaction Vessel
Permit No : ... | **Visit Details** : Investigative Emissions – July 2025
Variation No : ... | **Survey Dates** : 1st July 2025
Report Ref : P6125 : R001 | **Report Issue Date** : 20th August 2025

Aldehydes Uncertainty – Reaction Phase 1 – Test 2

Site: Descycle Ltd, Leicester University
Location: Materials Laboratory , Stack ID:Reaction Vessel

				Standard Uncertainty @ 95%		
Sampled Volume	V_m	0.00452	m^3	uV_m	0.0001	m^3
Meter Correction Factor or ml/count	Yd	0.994	...	...	...	...
Meter Temperature	T_m	299.33	k	uT_m	1.5	k
Barometric Pressure	ρ_b	1006.00	mBar		10.0	mBar
Oxygen content	$O_{2,m}$	20.90	%Vol	$uO_{2,m}$	1.25	%Vol
Moisture	H_2O	0.00	%Vol	uH_2O		%Vol

Tubes					
Determinand	Recovered Mass		Standard Uncertainty		
Formaldehyde	0.40	µg	uM	0.10	µg
Butyraldehyde	0.20	µg	uM	0.10	µg
Acetaldehyde	0.10	µg	uM	0.0500	µg
Propionaldehyde	0.20	µg	uM	0.10	µg
Benzaldehyde	0.20	µg	uM	0.10	µg
Valeraldehyde	0.20	µg	uM	0.10	µg
Hexanal	0.20	µg	uM	0.10	µg
Heptanal	0.20	µg	uM	0.10	µg

Note: In the following calculations, the sensitivity coefficient (C) is estimated using: $C_i = \frac{\partial f}{\partial x_i}$

For each factor, uncertainty is then calculated by, where C is the sensitivity coefficient, u is the standard uncertainty and i is the index identifying the contributing factor e.g. i=uV_m, uT_m etc.

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = 1.00$$

Uncertainty in correction factor to STP due to measured barometric pressure uncertainty component (upb), measured temperature of dry gas uncertainty component (uT_m) & measured moisture (uH_2O)

$$f_s = \frac{273}{T_m} \times \frac{\rho}{101.3} = 0.91$$

	Maximum	Minimum	Sensitivity	ufstp
up_b	0.48	0.47	0.000471	0.00471
uT_m	0.91	0.90	0.00303	0.00454
uH_2O	...	...	...	...

$$\frac{uf_s}{f_s} = \sqrt{\left(\frac{up_b}{(P_b/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{100/(100 - H_2O)}\right)^2} = 0.00570$$

Uncertainty in volume @ STP due to volume correction factor uncertainty component (uVstd) & volume uncertainty component (uVm)

$$V_{std} = V_{measured} \times f_s = 0.00407$$

	Maximum m^3	Minimum m^3	Sensitivity	Standard Uncertainty m^3
Effect of uf_s	0.00410	0.00404	0.00449	0.0000256
Effect of uV_m	0.00417	0.00397	0.90	0.000102

$$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uf_s}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = 0.0000934$$

Uncertainty of correction factor to reference conditions (excluding oxygen contribution) & Uncertainty in final measurement @ reference conditions due to uncertainty component arrising from leak and/or loss (assumed 2% max) in the sample system (uL)

$$uL = \frac{Conc \times \frac{2}{100}}{\sqrt{3}}$$

	Tubes uL mg/Nm^3	Condensate uL mg/Nm^3
Formaldehyde	0.00113	...
Butyraldehyde	0.000567	...
Acetaldehyde	0.000284	...
Propionaldehyde	0.000567	...
Benzaldehyde	0.000567	...
Valeraldehyde	0.000567	...
Hexanal	0.000567	...
Heptanal	0.000567	...

$$Conc = \frac{M_{Recovered}}{V_m \times f_s \times f_{O_2}}$$

Uncertainty in final measurement @ Reference Conditions due to $uM_{Recovered}$

Charcoal Tube Results

	Maximum mg/Nm^3	Minimum mg/Nm^3	Sensitivity	Standard Uncertainty mg/Nm^3
Formaldehyde	0.12	0.0737	245.73	0.0246
Butyraldehyde	0.0737	0.0246	245.73	0.0246
Acetaldehyde	0.0369	0.0123	245.73	0.0123
Propionaldehyde	0.0737	0.0246	245.73	0.0246
Benzaldehyde	0.0737	0.0246	245.73	0.0246
Valeraldehyde	0.0737	0.0246	245.73	0.0246
Hexanal	0.0737	0.0246	245.73	0.0246
Heptanal	0.0737	0.0246	245.73	0.0246

Condensate Results

	Maximum mg/Nm^3	Minimum mg/Nm^3	Sensitivity	Standard Uncertainty mg/Nm^3
Formaldehyde				
Butyraldehyde				
Acetaldehyde				
Propionaldehyde				
Benzaldehyde				
Valeraldehyde				
Hexanal				
Heptanal				

Uncertainty in final measurement @ Reference Conditions due to uV_{STD}

Charcoal Tube Results

	Maximum mg/Nm^3	Minimum mg/Nm^3	Sensitivity	Standard Uncertainty mg/Nm^3
Formaldehyde	0.10	0.0961	24.17	0.00226
Butyraldehyde	0.0503	0.0480	12.08	0.00113
Acetaldehyde	0.0252	0.0240	6.04	0.000564
Propionaldehyde	0.0503	0.0480	12.08	0.00113
Benzaldehyde	0.0503	0.0480	12.08	0.00113
Valeraldehyde	0.0503	0.0480	12.08	0.00113
Hexanal	0.0503	0.0480	12.08	0.00113
Heptanal	0.0503	0.0480	12.08	0.00113

Combined Uncertainty (excluding Oxygen contribution)

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{up})^2}$$

Charcoal Tubes: Determinand	Combined Uncertainty mg/Nm^3	Expanded Uncertainty mg/Nm^3	Measured Concentration mg/Nm^3	Percent of Measured Concentration
Formaldehyde	0.0247	0.0494	0.0983	50.26
Butyraldehyde	0.0246	0.0492	0.0491	100.13
Acetaldehyde	0.0123	0.0246	0.0246	100.13
Propionaldehyde	0.0246	0.0492	0.0491	100.13
Benzaldehyde	0.0246	0.0492	0.0491	100.13
Valeraldehyde	0.0246	0.0492	0.0491	100.13
Hexanal	0.0246	0.0492	0.0491	100.13
Heptanal	0.0246	0.0492	0.0491	100.13

DEScycle at Leicester University		**Installation Name**	**: Reaction Vessel**
Permit No	**: ...**	**Visit Details**	**: Investigative Emissions – July 2025**
Variation No	**: ...**	**Survey Dates**	**: 1st July 2025**
Report Ref	**: P6125 : R001**	**Report Issue Date**	**: 20th August 2025**

Aldehydes Uncertainty – Reaction Phase 2 – Test 1

Site: Descycle Ltd, Leicester University
Location: Materials Laboratory , Stack ID:Reaction Vessel

					Standard Uncertainty @ 95%	
Sampled Volume	V_m	0.00449	m^3	uV_m	0.0001	m^3
Meter Correction Factor or ml/count	**Yd**	0.994	...	...	...	...
Meter Temperature	T_m	300.00	k	uT_m	1.5	k
Barometric Pressure	ρ_b	1006.00	mBar		10.0	mBar
Oxygen content	$O_{2,m}$	20.90	%Vol	$uO_{2,m}$	1.25	%Vol
Moisture	H_2O	0.00	%Vol	uH_2O		%Vol

Tubes				
Determinand	**Recovered Mass**		**Standard Uncertainty**	
Formaldehyde	0.30	µg	**uM** 0.0750	µg
Butyraldehyde	0.20	µg	**uM** 0.10	µg
Acetaldehyde	2.80	µg	**uM** 0.14	µg
Propionaldehyde	0.20	µg	**uM** 0.10	µg
Benzaldehyde	0.20	µg	**uM** 0.10	µg
Valeraldehyde	0.20	µg	**uM** 0.10	µg
Hexanal	0.20	µg	**uM** 0.10	µg
Heptanal	0.20	µg	**uM** 0.10	µg

Note: In the following calculations, the sensitivity coefficient (C) is estimated using $C_i = \frac{\partial f}{\partial x_i}$

For each factor, uncertainty is then calculated by Cu_i **where** C **is the sensitivity coefficient,** u **is the standard uncertainty and** i **is the index identifying the contributing factor e.g. i=uV$_m$, uT$_m$ etc.**

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = \quad 1.00$$

Uncertainty in correction factor to STP due to measured barometric pressure uncertainty component (upb), measured temperature of dry gas uncertainty component (uT$_m$) & measured moisture (uH$_2$O)

$$f_s = \frac{273}{T_m} \times \frac{\rho}{101.3} = \quad 0.90$$

	Maximum	**Minimum**	**Sensitivity**	**ufstp**
up$_b$	0.48	0.47	0.000470	0.00470
uT$_m$	0.91	0.90	0.00301	0.00452
uH$_2$O	...	...	...	...

$$\frac{uf_s}{f_s} = \sqrt{\left(\frac{uP_b}{(P_b/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{100/(100 - H_2O)}\right)^2} = \quad 0.00567$$

Uncertainty in volume @ STP due to volume correction factor uncertainty component (uVstd) & volume uncertainty component (uVm)

$$V_{std} = V_{measured} \times f_s = \quad 0.00403$$

	Maximum m^3	**Minimum m^3**	**Sensitivity**	**Standard Uncertainty m^3**
Effect of uf$_s$	0.00406	0.00401	0.00446	0.0000253
Effect of uV$_m$	0.00413	0.00393	0.90	0.000101

$$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uf_s}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = \quad 0.0000924$$

Uncertainty of correction factor to reference conditions (excluding oxygen contribution) & Uncertainty in final measurement @ reference conditions due to uncertainty component arrising from leak and/or loss (assumed 2% max) in the sample system (uL)

$$uL = \frac{Conc \times \frac{2}{100}}{\sqrt{3}}$$

	Tubes uL mg/Nm^3	**Condensate uL mg/Nm^3**
Formaldehyde	0.000859	...
Butyraldehyde	0.000573	...
Acetaldehyde	0.00802	...
Propionaldehyde	0.000573	...
Benzaldehyde	0.000573	...
Valeraldehyde	0.000573	...
Hexanal	0.000573	...
Heptanal	0.000573	...

$$Conc = \frac{M_{Recovered}}{V_m \times f_s \times fo_s}$$

Uncertainty in final measurement @ Reference Conditions due to uM$_{Recovered}$

Charcoal Tube Results				
	Maximum mg/Nm^3	**Minimum mg/Nm^3**	**Sensitivity**	**Standard Uncertainty mg/Nm^3**
Formaldehyde	0.0930	0.0558	247.93	0.0186
Butyraldehyde	0.0744	0.0248	247.93	0.0248
Acetaldehyde	0.73	0.66	247.93	0.0347
Propionaldehyde	0.0744	0.0248	247.93	0.0248
Benzaldehyde	0.0744	0.0248	247.93	0.0248
Valeraldehyde	0.0744	0.0248	247.93	0.0248
Hexanal	0.0744	0.0248	247.93	0.0248
Heptanal	0.0744	0.0248	247.93	0.0248

Condensate Results				
	Maximum mg/Nm^3	**Minimum mg/Nm^3**	**Sensitivity**	**Standard Uncertainty mg/Nm^3**
Formaldehyde				
Butyraldehyde				
Acetaldehyde				
Propionaldehyde				
Benzaldehyde				
Valeraldehyde				
Hexanal				
Heptanal				

Uncertainty in final measurement @ Reference Conditions due to uV$_{STD}$

Charcoal Tube Results				
	Maximum mg/Nm^3	**Minimum mg/Nm^3**	**Sensitivity**	**Standard Uncertainty mg/Nm^3**
Formaldehyde	0.0761	0.0727	18.45	0.00170
Butyraldehyde	0.0507	0.0485	12.30	0.00114
Acetaldehyde	0.71	0.68	172.20	0.0159
Propionaldehyde	0.0507	0.0485	12.30	0.00114
Benzaldehyde	0.0507	0.0485	12.30	0.00114
Valeraldehyde	0.0507	0.0485	12.30	0.00114
Hexanal	0.0507	0.0485	12.30	0.00114
Heptanal	0.0507	0.0485	12.30	0.00114

Combined Uncertainty (excluding Oxygen contribution)

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{stp})^2}$$

Charcoal Tubes: Determinand	**Combined Uncertainty mg/Nm^3**	**Expanded Uncertainty mg/Nm^3**	**Measured Concentration mg/Nm^3**	**Percent of Measured Concentration**
Formaldehyde	0.0187	0.0374	0.0744	50.26
Butyraldehyde	0.0248	0.0497	0.0496	100.13
Acetaldehyde	0.0390	0.0780	0.69	11.24
Propionaldehyde	0.0248	0.0497	0.0496	100.13
Benzaldehyde	0.0248	0.0497	0.0496	100.13
Valeraldehyde	0.0248	0.0497	0.0496	100.13
Hexanal	0.0248	0.0497	0.0496	100.13
Heptanal	0.0248	0.0497	0.0496	100.13

DEScycle at Leicester University		**Installation Name**	**: Reaction Vessel**
Permit No	**: ...**	**Visit Details**	**: Investigative Emissions – July 2025**
Variation No	**: ...**	**Survey Dates**	**: 1st July 2025**
Report Ref	**: P6125 : R001**	**Report Issue Date**	**: 20th August 2025**

Aldehydes Uncertainty – Reaction Phase 2 – Test 2

Site: Descycle Ltd, Leicester University
Location: Materials Laboratory , Stack ID:Reaction Vessel

					Standard Uncertainty @ 95%		
Sampled Volume	V_m	0.00450	m^3		uV_m	0.0001	m^3
Meter Correction Factor or ml/count	**Yd**	0.994	...		...	...	...
Meter Temperature	T_m	302.00	k		uT_m	1.5	k
Barometric Pressure	p_b	1006.00	mBar			10.0	mBar
Oxygen content	$O_{2,m}$	20.90	%Vol		$uO_{2,m}$	1.25	%Vol
Moisture	H_2O	0.00	%Vol		uH_2O		%Vol

Tubes					
Determinand	**Recovered Mass**			**Standard Uncertainty**	
Formaldehyde	0.30	µg	**uM**	0.0750	µg
Butyraldehyde	0.20	µg	**uM**	0.10	µg
Acetaldehyde	0.70	µg	**uM**	0.11	µg
Propionaldehyde	0.20	µg	**uM**	0.10	µg
Benzaldehyde	0.20	µg	**uM**	0.10	µg
Valeraldehyde	0.20	µg	**uM**	0.10	µg
Hexanal	0.20	µg	**uM**	0.10	µg
Heptanal	0.20	µg	**uM**	0.10	µg

Note: In the following calculations, the sensitivity coefficient (C) is estimated using $C_i = \frac{\partial f}{\partial x_i}$

For each factor, uncertainty is then calculated by $C_i u_i$ **where** C **is the sensitivity coefficient,** u **is the standard uncertainty and** i **is the index identifying the contributing factor e.g. i=uV$_m$, uT$_m$ etc.**

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = 1.00$$

Uncertainty in correction factor to STP due to measured barometric pressure uncertainty component (upb), measured temperature of dry gas uncertainty component (uT$_m$) & measured moisture (uH$_2$O)

$$f_s = \frac{273}{T_m} \times \frac{\rho}{101.3} = 0.90$$

	Maximum	**Minimum**	**Sensitivity**	**ufstp**
up$_b$	0.48	0.47	0.000469	0.00469
uT$_m$	0.90	0.89	0.00297	0.00446
uH$_2$O	...	...	...	...

$$\frac{uf_s}{f_s} = \sqrt{\left(\frac{uP_b}{(P_b/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{100/(100 - H_2O)}\right)^2} = 0.00557$$

Uncertainty in volume @ STP due to volume correction factor uncertainty component (uVstd) & volume uncertainty component (uVm)

$$V_{std} = V_{measured} \times f_s = 0.00402$$

	Maximum m^3	**Minimum m^3**	**Sensitivity**	**Standard Uncertainty m^3**
Effect of uf$_s$	0.00404	0.00399	0.00447	0.0000249
Effect of uV$_m$	0.00412	0.00392	0.89	0.000100

$$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uf_s}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = 0.0000914$$

Uncertainty of correction factor to reference conditions (excluding oxygen contribution) & Uncertainty in final measurement @ reference conditions due to uncertainty component arrising from leak and/or loss (assumed 2% max) in the sample system (uL)

$$uL = \frac{Conc \times \frac{2}{100}}{\sqrt{3}}$$

	Tubes uL mg/Nm^3	**Condensate uL mg/Nm^3**
Formaldehyde	0.000863	...
Butyraldehyde	0.000575	...
Acetaldehyde	0.00201	...
Propionaldehyde	0.000575	...
Benzaldehyde	0.000575	...
Valeraldehyde	0.000575	...
Hexanal	0.000575	...
Heptanal	0.000575	...

$$Conc = \frac{M_{Recovered}}{V_m \times f_s \times f_{O_2}}$$

Uncertainty in final measurement @ Reference Conditions due to uM$_{Recovered}$

Charcoal Tube Results				
	Maximum mg/Nm^3	**Minimum mg/Nm^3**	**Sensitivity**	**Standard Uncertainty mg/Nm^3**
Formaldehyde	0.0934	0.0560	249.02	0.0187
Butyraldehyde	0.0747	0.0249	249.02	0.0249
Acetaldehyde	0.20	0.15	249.02	0.0261
Propionaldehyde	0.0747	0.0249	249.02	0.0249
Benzaldehyde	0.0747	0.0249	249.02	0.0249
Valeraldehyde	0.0747	0.0249	249.02	0.0249
Hexanal	0.0747	0.0249	249.02	0.0249
Heptanal	0.0747	0.0249	249.02	0.0249

Condensate Results				
	Maximum mg/Nm^3	**Minimum mg/Nm^3**	**Sensitivity**	**Standard Uncertainty mg/Nm^3**
Formaldehyde				
Butyraldehyde				
Acetaldehyde				
Propionaldehyde				
Benzaldehyde				
Valeraldehyde				
Hexanal				
Heptanal				

Uncertainty in final measurement @ Reference Conditions due to uV$_{STD}$

Charcoal Tube Results				
	Maximum mg/Nm^3	**Minimum mg/Nm^3**	**Sensitivity**	**Standard Uncertainty mg/Nm^3**
Formaldehyde	0.0764	0.0730	18.61	0.00170
Butyraldehyde	0.0510	0.0487	12.41	0.00113
Acetaldehyde	0.18	0.17	43.43	0.00397
Propionaldehyde	0.0510	0.0487	12.41	0.00113
Benzaldehyde	0.0510	0.0487	12.41	0.00113
Valeraldehyde	0.0510	0.0487	12.41	0.00113
Hexanal	0.0510	0.0487	12.41	0.00113
Heptanal	0.0510	0.0487	12.41	0.00113

Combined Uncertainty (excluding Oxygen contribution)

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{sp})^2}$$

Charcoal Tubes: Determinand	**Combined Uncertainty mg/Nm^3**	**Expanded Uncertainty mg/Nm^3**	**Measured Concentration mg/Nm^3**	**Percent of Measured Concentration**
Formaldehyde	0.0188	0.0375	0.0747	50.26
Butyraldehyde	0.0249	0.0499	0.0498	100.13
Acetaldehyde	0.0265	0.0530	0.17	30.43
Propionaldehyde	0.0249	0.0499	0.0498	100.13
Benzaldehyde	0.0249	0.0499	0.0498	100.13
Valeraldehyde	0.0249	0.0499	0.0498	100.13
Hexanal	0.0249	0.0499	0.0498	100.13
Heptanal	0.0249	0.0499	0.0498	100.13

DEScycle at Leicester University		**Installation Name**	**: Reaction Vessel**
Permit No	**: ...**	**Visit Details**	**: Investigative Emissions – July 2025**
Variation No	**: ...**	**Survey Dates**	**: 1st July 2025**
Report Ref	**: P6125 : R001**	**Report Issue Date**	**: 20th August 2025**

Aldehydes Uncertainty – Reaction Phase 3 – Test 1

Site: Descycle Ltd, Leicester University
Location: Materials Laboratory , Stack ID:Reaction Vessel

					Standard Uncertainty @ 95%		
Sampled Volume	V_m	0.00450	m^3		uV_m	0.0001	m^3
Meter Correction Factor or ml/count	**Yd**	0.994	...		...	...	...
Meter Temperature	T_m	302.00	k		uT_m	1.5	k
Barometric Pressure	ρ_b	1006.00	mBar			10.0	mBar
Oxygen content	$O_{2,m}$	20.90	%Vol		$uO_{2,m}$	1.25	%Vol
Moisture	H_2O	0.00	%Vol		uH_2O		%Vol

Tubes					
Determinand	**Recovered Mass**			**Standard Uncertainty**	
Formaldehyde	0.60	µg		**uM**	0.0900 µg
Butyraldehyde	0.20	µg		**uM**	0.10 µg
Acetaldehyde	4.30	µg		**uM**	0.22 µg
Propionaldehyde	0.20	µg		**uM**	0.10 µg
Benzaldehyde	0.20	µg		**uM**	0.10 µg
Valeraldehyde	0.20	µg		**uM**	0.10 µg
Hexanal	0.20	µg		**uM**	0.10 µg
Heptanal	0.20	µg		**uM**	0.10 µg

Note: In the following calculations, the sensitivity coefficient (C) is estimated using $C_i = \frac{\partial f}{\partial x_i}$

For each factor, uncertainty is then calculated by Cu_i **where** C **is the sensitivity coefficient,** u **is the standard uncertainty and** i **is the index identifying the contributing factor e.g. i=uV_m, uT_m etc.**

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = \quad 1.00$$

Uncertainty in correction factor to STP due to measured barometric pressure uncertainty component (up$_b$), measured temperature of dry gas uncertainty component (uT_m) & measured moisture (uH_2O)

$$f_s = \frac{273}{T_m} \times \frac{\rho}{101.3} = \quad 0.90$$

	Maximum	**Minimum**	**Sensitivity**	**ufstp**
up$_b$	0.48	0.47	0.000469	0.00469
uT_m	0.90	0.89	0.00297	0.00446
uH_2O	...	...	...	...

$$\frac{uf_s}{f_s} = \sqrt{\left(\frac{uP_b}{(P_b/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{100/(100 - H_2O)}\right)^2} = \quad 0.00557$$

Uncertainty in volume @ STP due to volume correction factor uncertainty component (uVstd) & volume uncertainty component (uVm)

$$V_{std} = V_{measured} \times f_s = \quad 0.00402$$

	Maximum m^3	**Minimum m^3**	**Sensitivity**	**Standard Uncertainty m^3**
Effect of uf$_s$	0.00404	0.00399	0.00447	0.0000249
Effect of uV$_m$	0.00412	0.00392	0.89	0.000100

$$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uf_s}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = \quad 0.0000914$$

Uncertainty of correction factor to reference conditions (excluding oxygen contribution) & Uncertainty in final measurement @ reference conditions due to uncertainty component arrising from leak and/or loss (assumed 2% max) in the sample system (uL)

$$uL = \frac{Conc \times \frac{2}{100}}{\sqrt{3}}$$

	Tubes uL mg/Nm^3	**Condensate uL mg/Nm^3**
Formaldehyde	0.00173	...
Butyraldehyde	0.000575	...
Acetaldehyde	0.0124	...
Propionaldehyde	0.000575	...
Benzaldehyde	0.000575	...
Valeraldehyde	0.000575	...
Hexanal	0.000575	...
Heptanal	0.000575	...

$$Conc = \frac{M_{Recovered}}{V_m \times f_s \times f_{O_2}}$$

Uncertainty in final measurement @ Reference Conditions due to uM$_{Recovered}$

Charcoal Tube Results

	Maximum mg/Nm^3	**Minimum mg/Nm^3**	**Sensitivity**	**Standard Uncertainty mg/Nm^3**
Formaldehyde	0.17	0.13	249.02	0.0224
Butyraldehyde	0.0747	0.0249	249.02	0.0249
Acetaldehyde	1.12	1.02	249.02	0.0535
Propionaldehyde	0.0747	0.0249	249.02	0.0249
Benzaldehyde	0.0747	0.0249	249.02	0.0249
Valeraldehyde	0.0747	0.0249	249.02	0.0249
Hexanal	0.0747	0.0249	249.02	0.0249
Heptanal	0.0747	0.0249	249.02	0.0249

Condensate Results

	Maximum mg/Nm^3	**Minimum mg/Nm^3**	**Sensitivity**	**Standard Uncertainty mg/Nm^3**
Formaldehyde				
Butyraldehyde				
Acetaldehyde				
Propionaldehyde				
Benzaldehyde				
Valeraldehyde				
Hexanal				
Heptanal				

Uncertainty in final measurement @ Reference Conditions due to uV$_{STD}$

Charcoal Tube Results

	Maximum mg/Nm^3	**Minimum mg/Nm^3**	**Sensitivity**	**Standard Uncertainty mg/Nm^3**
Formaldehyde	0.15	0.15	37.23	0.00340
Butyraldehyde	0.0510	0.0487	12.41	0.00113
Acetaldehyde	1.10	1.05	266.80	0.0244
Propionaldehyde	0.0510	0.0487	12.41	0.00113
Benzaldehyde	0.0510	0.0487	12.41	0.00113
Valeraldehyde	0.0510	0.0487	12.41	0.00113
Hexanal	0.0510	0.0487	12.41	0.00113
Heptanal	0.0510	0.0487	12.41	0.00113

Combined Uncertainty (excluding Oxygen contribution)

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{stp})^2}$$

Charcoal Tubes: Determinand	**Combined Uncertainty mg/Nm^3**	**Expanded Uncertainty mg/Nm^3**	**Measured Concentration mg/Nm^3**	**Percent of Measured Concentration**
Formaldehyde	0.0227	0.0455	0.15	30.43
Butyraldehyde	0.0249	0.0499	0.0498	100.13
Acetaldehyde	0.0601	0.12	1.07	11.23
Propionaldehyde	0.0249	0.0499	0.0498	100.13
Benzaldehyde	0.0249	0.0499	0.0498	100.13
Valeraldehyde	0.0249	0.0499	0.0498	100.13
Hexanal	0.0249	0.0499	0.0498	100.13
Heptanal	0.0249	0.0499	0.0498	100.13

DEScycle at Leicester University | **Installation Name** : Reaction Vessel
Permit No : ... | **Visit Details** : Investigative Emissions – July 2025
Variation No : ... | **Survey Dates** : 1st July 2025
Report Ref : P6125 : R001 | **Report Issue Date** : 20th August 2025

Aldehydes Uncertainty – Reaction Phase 3 – Test 2

Site: Descycle Ltd, Leicester University
Location: Materials Laboratory , Stack ID:Reaction Vessel

					Standard Uncertainty @ 95%		
Sampled Volume	V_m	0.00452	m^3		uV_m	0.0001	m^3
Meter Correction Factor or ml/count	Yd	0.994	...		...	...	...
Meter Temperature	T_m	302.00	k		uT_m	1.5	k
Barometric Pressure	ρ_b	1006.00	mBar			10.0	mBar
Oxygen content	$O_{2,m}$	20.90	%Vol		$uO_{2,m}$	1.25	%Vol
Moisture	H_2O	0.00	%Vol		uH_2O		%Vol

Tubes

Determinand	Recovered Mass		Standard Uncertainty		
Formaldehyde	0.60	µg	uM	0.0900	µg
Butyraldehyde	0.20	µg	uM	0.10	µg
Acetaldehyde	3.50	µg	uM	0.18	µg
Propionaldehyde	0.20	µg	uM	0.10	µg
Benzaldehyde	0.20	µg	uM	0.10	µg
Valeraldehyde	0.20	µg	uM	0.10	µg
Hexanal	0.20	µg	uM	0.10	µg
Heptanal	0.20	µg	uM	0.10	µg

Note: In the following calculations, the sensitivity coefficient (C) is estimated using: $C_{x_i} = \frac{\partial f}{\partial x_i}$

For each factor, uncertainty is then calculated by $C_i u_i$ where C is the sensitivity coefficient, u is the standard uncertainty and i is the index identifying the contributing factor e.g. i=uV$_m$, uT$_m$ etc.

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = \quad 1.00$$

Uncertainty in correction factor to STP due to measured barometric pressure uncertainty component (upb), measured temperature of dry gas uncertainty component (uT$_m$) & measured moisture (uH$_2$O)

$$f_s = \frac{273}{T_m} \times \frac{\rho}{101.3} = \quad 0.90$$

	Maximum	Minimum	Sensitivity	ufstp
up_b	0.48	0.47	0.000469	0.00469
uT_m	0.90	0.89	0.00297	0.00446
uH_2O	...	...	...	...

$$\frac{uf_s}{f_s} = \sqrt{\left(\frac{up_b}{(p_b/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{100/(100 - H_2O)}\right)^2} = \quad 0.00557$$

Uncertainty in volume @ STP due to volume correction factor uncertainty component (uVstd) & volume uncertainty component (uVm)

$$V_{std} = V_{measured} \times f_s = \quad 0.00403$$

	Maximum m^3	Minimum m^3	Sensitivity	Standard Uncertainty m^3
Effect of uf_s	0.00406	0.00401	0.00449	0.0000250
Effect of uV_m	0.00413	0.00393	0.89	0.000101

$$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uf_s}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = \quad 0.0000918$$

Uncertainty of correction factor to reference conditions (excluding oxygen contribution) & Uncertainty in final measurement @ reference conditions due to uncertainty component arrising from leak and/or loss (assumed 2% max) in the sample system (uL)

$$uL = \frac{Conc \times \frac{2}{100}}{\sqrt{3}}$$

	Tubes uL mg/Nm^3	Condensate uL mg/Nm^3
Formaldehyde	0.00172	...
Butyraldehyde	0.000573	...
Acetaldehyde	0.0100	...
Propionaldehyde	0.000573	...
Benzaldehyde	0.000573	...
Valeraldehyde	0.000573	...
Hexanal	0.000573	...
Heptanal	0.000573	...

$$Conc = \frac{M_{Recovered}}{V_m \times f_s \times f_{O_2}}$$

Uncertainty in final measurement @ Reference Conditions due to uM$_{Recovered}$

Charcoal Tube Results

	Maximum mg/Nm^3	Minimum mg/Nm^3	Sensitivity	Standard Uncertainty mg/Nm^3
Formaldehyde	0.17	0.13	247.92	0.0223
Butyraldehyde	0.0744	0.0248	247.92	0.0248
Acetaldehyde	0.91	0.82	247.92	0.0434
Propionaldehyde	0.0744	0.0248	247.92	0.0248
Benzaldehyde	0.0744	0.0248	247.92	0.0248
Valeraldehyde	0.0744	0.0248	247.92	0.0248
Hexanal	0.0744	0.0248	247.92	0.0248
Heptanal	0.0744	0.0248	247.92	0.0248

Condensate Results

	Maximum mg/Nm^3	Minimum mg/Nm^3	Sensitivity	Standard Uncertainty mg/Nm^3
Formaldehyde				
Butyraldehyde				
Acetaldehyde				
Propionaldehyde				
Benzaldehyde				
Valeraldehyde				
Hexanal				
Heptanal				

Uncertainty in final measurement @ Reference Conditions due to uV$_{STD}$

Charcoal Tube Results

	Maximum mg/Nm^3	Minimum mg/Nm^3	Sensitivity	Standard Uncertainty mg/Nm^3
Formaldehyde	0.15	0.15	36.90	0.00339
Butyraldehyde	0.0507	0.0485	12.30	0.00113
Acetaldehyde	0.89	0.85	215.24	0.0198
Propionaldehyde	0.0507	0.0485	12.30	0.00113
Benzaldehyde	0.0507	0.0485	12.30	0.00113
Valeraldehyde	0.0507	0.0485	12.30	0.00113
Hexanal	0.0507	0.0485	12.30	0.00113
Heptanal	0.0507	0.0485	12.30	0.00113

Combined Uncertainty (excluding Oxygen contribution)

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{up})^2}$$

Charcoal Tubes: Determinand	Combined Uncertainty mg/Nm^3	Expanded Uncertainty mg/Nm^3	Measured Concentration mg/Nm^3	Percent of Measured Concentration
Formaldehyde	0.0226	0.0453	0.15	30.43
Butyraldehyde	0.0248	0.0496	0.0496	100.13
Acetaldehyde	0.0487	0.0974	0.87	11.23
Propionaldehyde	0.0248	0.0496	0.0496	100.13
Benzaldehyde	0.0248	0.0496	0.0496	100.13
Valeraldehyde	0.0248	0.0496	0.0496	100.13
Hexanal	0.0248	0.0496	0.0496	100.13
Heptanal	0.0248	0.0496	0.0496	100.13

DEScycle at Leicester University			Installation Name	: Reaction Vessel
Permit No	: ...		Visit Details	: Investigative Emissions – July 2025
Variation No	: ...		Survey Dates	: 1st July 2025
Report Ref	: P6125	: R001	Report Issue Date	: 20th August 2025

Total Hydrocarbons Uncertainty – Reaction Phase 1 – Test 1

Site: Descycle Ltd, Leicester University
Location: Materials Laboratory , Stack ID:Reaction Vessel

				Standard Uncertainty @ 95%		
Sampled Volume	V_m	0.00452	m^3	uV_m	0.0001	m^3
Meter Correction Factor or ml/count	Yd	0.989	...	...	...	...
Meter Temperature	T_m	298.67	k	uT_m	1.5	k
Barometric Pressure	ρ_b	1006.00	mBar		10.0	mBar
Oxygen content	$O_{2,m}$	20.90	%Vol	$uO_{2,m}$	1.25	%Vol
Moisture	H_2O	0.00	%Vol	uH_2O		%Vol

Tubes					
Determinand	Recovered Mass			Standard Uncertainty	
Total Hydrocarbons	10.00	µg	uM	5.00	µg

Note: In the following calculations, the sensitivity coefficient (C) is estimated using $C_i = \frac{\partial f}{\partial x_i}$

For each factor, uncertainty is then calculated by Cu_i where C is the sensitivity coefficient, u is the standard uncertainty and i is the index identifying the contributing factor e.g. i=uV_m, uT_m etc.

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = \quad 1.00$$

Uncertainty in correction factor to STP due to measured barometric pressure uncertainty component ($u\rho b$), measured temperature of dry gas uncertainty component (uT_m) & measured moisture (uH_2O)

$$f_s = \frac{273}{T_m} \times \frac{\rho}{101.3} = \quad 0.91$$

	Maximum	Minimum	Sensitivity	ufstp
$u\rho_b$	0.48	0.47	0.000471	0.00471
uT_m	0.91	0.90	0.00304	0.00456
uH_2O	...	...	...	...

$$\frac{uf_s}{f_s} = \sqrt{\left(\frac{uP_b}{(P_b/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{100/(100 - H_2O)}\right)^2} = \quad 0.00574$$

Uncertainty in volume @ STP due to volume correction factor uncertainty component (uVstd) & volume uncertainty component (uVm)

$$V_{std} = V_{measured} \times f_s = \quad 0.00406$$

	Maximum m^3	Minimum m^3	Sensitivity	Standard Uncertainty m^3
Effect of uf_s	0.00408	0.00403	0.00447	0.0000256
Effect of uV_m	0.00416	0.00396	0.90	0.000101

$$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uf_s}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = \quad 0.0000929$$

Uncertainty of correction factor to reference conditions (excluding oxygen contribution) & Uncertainty in final measurement @ reference conditions due to uncertainty component arrising from leak and/or loss (assumed 2% max) in the sample system (uL)

$$uL = \frac{Conc \times \frac{2}{100}}{\sqrt{3}}$$

	Tubes uL mg/Nm³	Condensate uL mg/Nm³
Total Hydrocarbons	0.0285	...

$$Conc = \frac{M_{Recovered}}{V_m \times f_s \times f_{O_2}}$$

Uncertainty in final measurement @ Reference Conditions due to $uM_{Recovered}$

Charcoal Tube Results				
	Maximum mg/Nm³	Minimum mg/Nm³	Sensitivity	Standard Uncertainty mg/Nm³
Total Hydrocarbons	3.70	1.23	246.43	1.23

Condensate Results				
	Maximum mg/Nm³	Minimum mg/Nm³	Sensitivity	Standard Uncertainty mg/Nm³
Total Hydrocarbons				

Uncertainty in final measurement @ Reference Conditions due to uV_{STD}

Charcoal Tube Results				
	Maximum mg/Nm³	Minimum mg/Nm³	Sensitivity	Standard Uncertainty mg/Nm³
Total Hydrocarbons	2.52	2.41	607.58	0.0564

Combined Uncertainty (excluding Oxygen contribution)

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{stp})^2}$$

Charcoal Tubes: Determinand	Combined Uncertainty mg/Nm³	Expanded Uncertainty mg/Nm³	Measured Concentration mg/Nm³	Percent of Measured Concentration
Total Hydrocarbons	1.23	2.47	2.46	100.13

DEScycle at Leicester University			Installation Name	: Reaction Vessel
Permit No	: ...		Visit Details	: Investigative Emissions – July 2025
Variation No	: ...		Survey Dates	: 1st July 2025
Report Ref	: P6125	: R001	Report Issue Date	: 20th August 2025

Total Hydrocarbons Uncertainty – Reaction Phase 1 – Test 2

Site: Descycle Ltd, Leicester University
Location: Materials Laboratory , Stack ID:Reaction Vessel

				Standard Uncertainty @ 95%		
Sampled Volume	V_m	0.00452	m^3	uV_m	0.0001	m^3
Meter Correction Factor or ml/count	Yd	0.989	...	...	...	...
Meter Temperature	T_m	299.33	k	uT_m	1.5	k
Barometric Pressure	ρ_b	1006.00	mBar		10.0	mBar
Oxygen content	$O_{2,m}$	20.90	%Vol	$uO_{2,m}$	1.25	%Vol
Moisture	H_2O	0.00	%Vol	uH_2O		%Vol

Tubes					
Determinand	Recovered Mass			Standard Uncertainty	
Total Hydrocarbons	10.00	µg	uM	5.00	µg

Note: In the following calculations, the sensitivity coefficient (C) is estimated using $C_i = \frac{\partial f}{\partial x_i}$

For each factor, uncertainty is then calculated by $C_i u_i$ where C is the sensitivity coefficient, u is the standard uncertainty and i is the index identifying the contributing factor e.g. i=uV_m, uT_m etc.

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = 1.00$$

Uncertainty in correction factor to STP due to measured barometric pressure uncertainty component (upb), measured temperature of dry gas uncertainty component (uT_m) & measured moisture (uH_2O)

$$f_s = \frac{273}{T_m} \times \frac{\rho}{101.3} = 0.91$$

	Maximum	Minimum	Sensitivity	ufstp
up_b	0.48	0.47	0.000471	0.00471
uT_m	0.91	0.90	0.00303	0.00454
uH_2O	...	...	...	...

$$\frac{uf_s}{f_s} = \sqrt{\left(\frac{uP_b}{(P_b/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{100/(100 - H_2O)}\right)^2} = 0.00570$$

Uncertainty in volume @ STP due to volume correction factor uncertainty component (uVstd) & volume uncertainty component (uVm)

$$V_{std} = V_{measured} \times f_s = 0.00405$$

	Maximum m^3	Minimum m^3	Sensitivity	Standard Uncertainty m^3
Effect of uf_s	0.00407	0.00402	0.00447	0.0000255
Effect of uV_m	0.00415	0.00395	0.90	0.000101

$$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uf_s}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = 0.0000925$$

Uncertainty of correction factor to reference conditions (excluding oxygen contribution) & Uncertainty in final measurement @ reference conditions due to uncertainty component arrising from leak and/or loss (assumed 2% max) in the sample system (uL)

$$uL = \frac{Conc \times \frac{2}{100}}{\sqrt{3}}$$

	Tubes uL mg/Nm³	Condensate uL mg/Nm³
Total Hydrocarbons	0.0285	...

$$Conc = \frac{M_{Recovered}}{V_m \times f_s \times f_{O_2}}$$

Uncertainty in final measurement @ Reference Conditions due to $uM_{Recovered}$

Charcoal Tube Results				
	Maximum mg/Nm³	Minimum mg/Nm³	Sensitivity	Standard Uncertainty mg/Nm³
Total Hydrocarbons	3.70	1.23	246.98	1.23
Condensate Results				
	Maximum mg/Nm³	Minimum mg/Nm³	Sensitivity	Standard Uncertainty mg/Nm³
Total Hydrocarbons				

Uncertainty in final measurement @ Reference Conditions due to uV_{STD}

Charcoal Tube Results				
	Maximum mg/Nm³	Minimum mg/Nm³	Sensitivity	Standard Uncertainty mg/Nm³
Total Hydrocarbons	2.53	2.41	610.29	0.0564

Combined Uncertainty (excluding Oxygen contribution)

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{stp})^2}$$

Charcoal Tubes: Determinand	Combined Uncertainty mg/Nm³	Expanded Uncertainty mg/Nm³	Measured Concentration mg/Nm³	Percent of Measured Concentration
Total Hydrocarbons	1.24	2.47	2.47	100.13

DEScycle at Leicester University			Installation Name	: Reaction Vessel
Permit No	: ...		Visit Details	: Investigative Emissions – July 2025
Variation No	: ...		Survey Dates	: 1st July 2025
Report Ref	: P6125	: R001	Report Issue Date	: 20th August 2025

Total Hydrocarbons Uncertainty – Reaction Phase 2 – Test 1

Site: Descycle Ltd, Leicester University
Location: Materials Laboratory , Stack ID:Reaction Vessel

				Standard Uncertainty @ 95%		
Sampled Volume	V_m	0.00449	m^3	uV_m	0.0001	m^3
Meter Correction Factor or ml/count	Yd	0.989	...	...	...	...
Meter Temperature	T_m	300.00	k	uT_m	1.5	k
Barometric Pressure	ρ_b	1006.00	mBar		10.0	mBar
Oxygen content	$O_{2,m}$	20.90	%Vol	$uO_{2,m}$	1.25	%Vol
Moisture	H_2O	0.00	%Vol	uH_2O		%Vol

Tubes					
Determinand	Recovered Mass			Standard Uncertainty	
Total Hydrocarbons	10.00	µg	uM	5.00	µg

Note: In the following calculations, the sensitivity coefficient (C) is estimated using $C_i = \frac{\partial f}{\partial x_i}$

For each factor, uncertainty is then calculated by $C_i u_i$ **where** C **is the sensitivity coefficient,** u **is the standard uncertainty and** i **is the index identifying the contributing factor e.g. i=uV_m, uT_m etc.**

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = 1.00$$

Uncertainty in correction factor to STP due to measured barometric pressure uncertainty component (up_b), measured temperature of dry gas uncertainty component (uT_m) & measured moisture (uH_2O)

$$f_s = \frac{273}{T_m} \times \frac{\rho}{101.3} = 0.90$$

	Maximum	Minimum	Sensitivity	ufstp
up_b	0.48	0.47	0.000470	0.00470
uT_m	0.91	0.90	0.00301	0.00452
uH_2O	...	...	...	...

$$\frac{uf_s}{f_s} = \sqrt{\left(\frac{uP_b}{(P_b/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{100/(100 - H_2O)}\right)^2} = 0.00567$$

Uncertainty in volume @ STP due to volume correction factor uncertainty component (uVstd) & volume uncertainty component (uVm)

$$V_{std} = V_{measured} \times f_s = 0.00401$$

	Maximum m^3	Minimum m^3	Sensitivity	Standard Uncertainty m^3
Effect of uf_s	0.00404	0.00399	0.00444	0.0000252
Effect of uV_m	0.00411	0.00391	0.89	0.000100

$$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uf_s}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = 0.0000914$$

Uncertainty of correction factor to reference conditions (excluding oxygen contribution) & Uncertainty in final measurement @ reference conditions due to uncertainty component arrising from leak and/or loss (assumed 2% max) in the sample system (uL)

$$uL = \frac{Conc \times \frac{2}{100}}{\sqrt{3}}$$

	Tubes uL mg/Nm^3	Condensate uL mg/Nm^3
Total Hydrocarbons	0.0288	...

$$Conc = \frac{M_{Recovered}}{V_m \times f_s \times f_{O_2}}$$

Uncertainty in final measurement @ Reference Conditions due to $uM_{Recovered}$

Charcoal Tube Results				
	Maximum mg/Nm^3	Minimum mg/Nm^3	Sensitivity	Standard Uncertainty mg/Nm^3
Total Hydrocarbons	3.74	1.25	249.18	1.25
Condensate Results				
	Maximum mg/Nm^3	Minimum mg/Nm^3	Sensitivity	Standard Uncertainty mg/Nm^3
Total Hydrocarbons				

Uncertainty in final measurement @ Reference Conditions due to uV_{STD}

Charcoal Tube Results				
	Maximum mg/Nm^3	Minimum mg/Nm^3	Sensitivity	Standard Uncertainty mg/Nm^3
Total Hydrocarbons	2.55	2.44	621.23	0.0568

Combined Uncertainty (excluding Oxygen contribution)

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{stp})^2}$$

Charcoal Tubes: Determinand	Combined Uncertainty mg/Nm^3	Expanded Uncertainty mg/Nm^3	Measured Concentration mg/Nm^3	Percent of Measured Concentration
Total Hydrocarbons	1.25	2.50	2.49	100.13

DEScycle at Leicester University			Installation Name	: Reaction Vessel
Permit No	: ...		Visit Details	: Investigative Emissions – July 2025
Variation No	: ...		Survey Dates	: 1st July 2025
Report Ref	: P6125	: R001	Report Issue Date	: 20th August 2025

Total Hydrocarbons Uncertainty – Reaction Phase 2 – Test 2

Site: Descycle Ltd, Leicester University
Location: Materials Laboratory , Stack ID:Reaction Vessel

					Standard Uncertainty @ 95%		
Sampled Volume	V_m	0.00450	m^3	uV_m	0.0001	m^3
Meter Correction Factor or ml/count	Yd	0.989	...	...	...	...
Meter Temperature	T_m	302.00	k	uT_m	1.5	k
Barometric Pressure	ρ_b	1006.00	mBar		10.0	mBar
Oxygen content	$O_{2,m}$	20.90	%Vol	$uO_{2,m}$	1.25	%Vol
Moisture	H_2O	0.00	%Vol	uH_2O		%Vol

Tubes					
Determinand	Recovered Mass			Standard Uncertainty	
Total Hydrocarbons	10.00	µg	uM	5.00	µg

Note: In the following calculations, the sensitivity coefficient (C) is estimated using: $C_i = \frac{\partial f}{\partial x_i}$

For each factor, uncertainty is then calculated by Cu_i where C is the sensitivity coefficient, u is the standard uncertainty and i is the index identifying the contributing factor e.g. i=uV_m, uT_m etc.

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = 1.00$$

Uncertainty in correction factor to STP due to measured barometric pressure uncertainty component (upb), measured temperature of dry gas uncertainty component (uT_m) & measured moisture (uH_2O)

$$f_s = \frac{273}{T_m} \times \frac{\rho}{101.3} = 0.90$$

	Maximum	Minimum	Sensitivity	ufstp
up_b	0.48	0.47	0.000469	0.00469
uT_m	0.90	0.89	0.00297	0.00446
uH_2O	...	...	...	...

$$\frac{uf_s}{f_s} = \sqrt{\left(\frac{uP_b}{(P_b/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{100/(100 - H_2O)}\right)^2} = 0.00557$$

Uncertainty in volume @ STP due to volume correction factor uncertainty component (uVstd) & volume uncertainty component (uVm)

$$V_{std} = V_{measured} \times f_s = 0.00400$$

	Maximum m^3	Minimum m^3	Sensitivity	Standard Uncertainty m^3
Effect of uf_s	0.00402	0.00397	0.00445	0.0000248
Effect of uV_m	0.00410	0.00390	0.89	0.0000999

$$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uf_s}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = 0.0000904$$

Uncertainty of correction factor to reference conditions (excluding oxygen contribution) & Uncertainty in final measurement @ reference conditions due to uncertainty component arrising from leak and/or loss (assumed 2% max) in the sample system (uL)

$$uL = \frac{Conc \times \frac{2}{100}}{\sqrt{3}}$$

	Tubes uL mg/Nm³	Condensate uL mg/Nm³
Total Hydrocarbons	0.0289	...

$$Conc = \frac{M_{Recovered}}{V_m \times f_s \times f_{O_2}}$$

Uncertainty in final measurement @ Reference Conditions due to $uM_{Recovered}$

Charcoal Tube Results	Maximum mg/Nm³	Minimum mg/Nm³	Sensitivity	Standard Uncertainty mg/Nm³
Total Hydrocarbons	3.75	1.25	250.28	1.25
Condensate Results	**Maximum mg/Nm³**	**Minimum mg/Nm³**	**Sensitivity**	**Standard Uncertainty mg/Nm³**
Total Hydrocarbons				

Uncertainty in final measurement @ Reference Conditions due to uV_{STD}

Charcoal Tube Results	Maximum mg/Nm³	Minimum mg/Nm³	Sensitivity	Standard Uncertainty mg/Nm³
Total Hydrocarbons	2.56	2.45	626.74	0.0567

Combined Uncertainty (excluding Oxygen contribution)

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{stp})^2}$$

Charcoal Tubes: Determinand	Combined Uncertainty mg/Nm³	Expanded Uncertainty mg/Nm³	Measured Concentration mg/Nm³	Percent of Measured Concentration
Total Hydrocarbons	1.25	2.51	2.50	100.13

DEScycle at Leicester University		**Installation Name**	**: Reaction Vessel**
Permit No	**: ...**	**Visit Details**	**: Investigative Emissions – July 2025**
Variation No	**: ...**	**Survey Dates**	**: 1st July 2025**
Report Ref	**: P6125 : R001**	**Report Issue Date**	**: 20th August 2025**

Total Hydrocarbons Uncertainty – Reaction Phase 3 – Test 1

Site: Descycle Ltd, Leicester University
Location: Materials Laboratory , Stack ID:Reaction Vessel

					Standard Uncertainty @ 95%	
Sampled Volume	V_m	0.00450	m^3	uV_m	0.0001	m^3
Meter Correction Factor or ml/count	**Yd**	0.989	...	...	...	...
Meter Temperature	T_m	302.00	k	uT_m	1.5	k
Barometric Pressure	ρ_b	1006.00	mBar		10.0	mBar
Oxygen content	$O_{2,m}$	20.90	%Vol	$uO_{2,m}$	1.25	%Vol
Moisture	H_2O	0.00	%Vol	uH_2O		%Vol

Tubes					
Determinand	**Recovered Mass**			**Standard Uncertainty**	
Total Hydrocarbons	56.00	µg	**uM**	2.80	µg

Note: In the following calculations, the sensitivity coefficient (C) is estimated using $C_i = \frac{\partial f}{\partial x_i}$

For each factor, uncertainty is then calculated by $C_i u_i$ **where** C **is the sensitivity coefficient,** u **is the standard uncertainty and** i **is the index identifying the contributing factor e.g. i=uV_m, uT_m etc.**

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = \quad 1.00$$

Uncertainty in correction factor to STP due to measured barometric pressure uncertainty component (upb), measured temperature of dry gas uncertainty component (uT_m) & measured moisture (uH_2O)

$$f_s = \frac{273}{T_m} \times \frac{\rho}{101.3} = \quad 0.90$$

	Maximum	Minimum	Sensitivity	ufstp
up_b	0.48	0.47	0.000469	0.00469
uT_m	0.90	0.89	0.00297	0.00446
uH_2O	...	...	...	...

$$\frac{uf_s}{f_s} = \sqrt{\left(\frac{uP_b}{(P_b/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{100/(100 - H_2O)}\right)^2} = \quad 0.00557$$

Uncertainty in volume @ STP due to volume correction factor uncertainty component (uVstd) & volume uncertainty component (uVm)

$$V_{std} = V_{measured} \times f_s = \quad 0.00400$$

	Maximum m^3	Minimum m^3	Sensitivity	Standard Uncertainty m^3
Effect of uf_s	0.00402	0.00397	0.00445	0.0000248
Effect of uV_m	0.00410	0.00390	0.89	0.0000999

$$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uf_s}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = \quad 0.0000904$$

Uncertainty of correction factor to reference conditions (excluding oxygen contribution) & Uncertainty in final measurement @ reference conditions due to uncertainty component arrising from leak and/or loss (assumed 2% max) in the sample system (uL)

$$uL = \frac{Conc \times \frac{2}{100}}{\sqrt{3}}$$

	Tubes uL mg/Nm³	Condensate uL mg/Nm³
Total Hydrocarbons	0.16	...

$$Conc = \frac{M_{Recovered}}{V_m \times f_s \times f_{O_2}}$$

Uncertainty in final measurement @ Reference Conditions due to $uM_{Recovered}$

Charcoal Tube Results				
	Maximum mg/Nm³	**Minimum mg/Nm³**	**Sensitivity**	**Standard Uncertainty mg/Nm³**
Total Hydrocarbons	14.72	13.32	250.28	0.70

Condensate Results				
	Maximum mg/Nm³	**Minimum mg/Nm³**	**Sensitivity**	**Standard Uncertainty mg/Nm³**
Total Hydrocarbons				

Uncertainty in final measurement @ Reference Conditions due to uV_{STD}

Charcoal Tube Results				
	Maximum mg/Nm³	**Minimum mg/Nm³**	**Sensitivity**	**Standard Uncertainty mg/Nm³**
Total Hydrocarbons	14.34	13.71	3509.75	0.32

Combined Uncertainty (excluding Oxygen contribution)

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{stp})^2}$$

Charcoal Tubes: Determinand	Combined Uncertainty mg/Nm³	Expanded Uncertainty mg/Nm³	Measured Concentration mg/Nm³	Percent of Measured Concentration
Total Hydrocarbons	0.79	1.57	14.02	11.22

DEScycle at Leicester University			Installation Name	: Reaction Vessel
Permit No	: ...		Visit Details	: Investigative Emissions – July 2025
Variation No	: ...		Survey Dates	: 1st July 2025
Report Ref	: P6125	: R001	Report Issue Date	: 20th August 2025

Total Hydrocarbons Uncertainty – Reaction Phase 3 – Test 2

Site: Descycle Ltd, Leicester University
Location: Materials Laboratory , Stack ID:Reaction Vessel

					Standard Uncertainty @ 95%		
Sampled Volume	V_m	0.00452	m^3	uV_m	0.0001	m^3
Meter Correction Factor or ml/count	Yd	0.989	...	...	...	...
Meter Temperature	T_m	302.00	k	uT_m	1.5	k
Barometric Pressure	ρ_b	1006.00	mBar		10.0	mBar
Oxygen content	$O_{2,m}$	20.90	%Vol	$uO_{2,m}$	1.25	%Vol
Moisture	H_2O	0.00	%Vol	uH_2O		%Vol

Tubes					
Determinand	Recovered Mass		Standard Uncertainty		
Total Hydrocarbons	32.00	µg	uM	1.60	µg

Note: In the following calculations, the sensitivity coefficient (C) is estimated using $C_i = \frac{\partial f}{\partial x_i}$

For each factor, uncertainty is then calculated by $C_i u_i$ **where C is the sensitivity coefficient, u is the standard uncertainty and i is the index identifying the contributing factor e.q. i=uV_m, uT_m etc.**

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = 1.00$$

Uncertainty in correction factor to STP due to measured barometric pressure uncertainty component (uρb), measured temperature of dry gas uncertainty component (uT_m) & measured moisture (uH_2O)

$$f_s = \frac{273}{T_m} \times \frac{\rho}{101.3} = 0.90$$

	Maximum	Minimum	Sensitivity	ufstp
$u\rho_b$	0.48	0.47	0.000469	0.00469
uT_m	0.90	0.89	0.00297	0.00446
uH_2O	...	...	...	...

$$\frac{uf_s}{f_s} = \sqrt{\left(\frac{uP_b}{(P_b/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{100/(100 - H_2O)}\right)^2} = 0.00557$$

Uncertainty in volume @ STP due to volume correction factor uncertainty component (uVstd) & volume uncertainty component (uVm)

$$V_{std} = V_{measured} \times f_s = 0.00401$$

	Maximum m^3	Minimum m^3	Sensitivity	Standard Uncertainty m^3
Effect of uf_s	0.00404	0.00399	0.00447	0.0000249
Effect of uV_m	0.00411	0.00391	0.89	0.000100

$$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uf_s}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = 0.0000909$$

Uncertainty of correction factor to reference conditions (excluding oxygen contribution) & Uncertainty in final measurement @ reference conditions due to uncertainty component arrising from leak and/or loss (assumed 2% max) in the sample system (uL)

$$uL = \frac{Conc \times \frac{2}{100}}{\sqrt{3}}$$

	Tubes uL mg/Nm³	Condensate uL mg/Nm³
Total Hydrocarbons	0.0921	...

$$Conc = \frac{M_{Recovered}}{V_m \times f_s \times f_{O_2}}$$

Uncertainty in final measurement @ Reference Conditions due to $uM_{Recovered}$

Charcoal Tube Results				
	Maximum mg/Nm³	Minimum mg/Nm³	Sensitivity	Standard Uncertainty mg/Nm³
Total Hydrocarbons	8.37	7.57	249.18	0.40

Condensate Results				
	Maximum mg/Nm³	Minimum mg/Nm³	Sensitivity	Standard Uncertainty mg/Nm³
Total Hydrocarbons				

Uncertainty in final measurement @ Reference Conditions due to uV_{STD}

Charcoal Tube Results				
	Maximum mg/Nm³	Minimum mg/Nm³	Sensitivity	Standard Uncertainty mg/Nm³
Total Hydrocarbons	8.16	7.80	1987.86	0.18

Combined Uncertainty (excluding Oxygen contribution)

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{stp})^2}$$

Charcoal Tubes: Determinand	Combined Uncertainty mg/Nm³	Expanded Uncertainty mg/Nm³	Measured Concentration mg/Nm³	Percent of Measured Concentration
Total Hydrocarbons	0.45	0.89	7.97	11.22

DEScycle at Leicester University			**Installation Name**	**: Reaction Vessel**
Permit No	**: ...**		**Visit Details**	**: Investigative Emissions – July 2025**
Variation No	**: ...**		**Survey Dates**	**: 1st July 2025**
Report Ref	**: P6125**	**: R001**	**Report Issue Date**	**: 20th August 2025**

Speciated VOC Uncertainty – Reaction Phase 1 – Test 1

Site: Descycle Ltd, Leicester University
Location: Materials Laboratory , Stack ID:Reaction Vessel

				Standard Uncertainty @ 95%		
Sampled Volume	V_m	0.00452	m^3	uV_m	0.0001	m^3
Meter Correction Factor or ml/count	**Yd**	0.989	...	...	...	...
Meter Temperature	T_m	298.67	k	uT_m	1.5	k
Barometric Pressure	ρ_b	1006.00	mBar		10.0	mBar
Oxygen content	$O_{2,m}$	20.90	%Vol	$uO_{2,m}$	1.25	%Vol
Moisture	H_2O	0.00	%Vol	uH_2O		%Vol

Tubes					
Determinand	**Recovered Mass**			**Standard Uncertainty**	
Speciated VOC	5.00	µg	**uM**	2.50	µg

Note: In the following calculations, the sensitivity coefficient (C) is estimated using: $C_i = \frac{\partial f}{\partial x_i}$

For each factor, uncertainty is then calculated by $C_i u_i$ **where** C **is the sensitivity coefficient,** u **is the standard uncertainty and** i **is the index identifying the contributing factor e.g. i=uV_m, uT_m etc.**

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = 1.00$$

Uncertainty in correction factor to STP due to measured barometric pressure uncertainty component (upb), measured temperature of dry gas uncertainty component (uT_m) & measured moisture (uH_2O)

$$f_s = \frac{273}{T_m} \times \frac{\rho}{101.3} = 0.91$$

	Maximum	**Minimum**	**Sensitivity**	**ufstp**
$u\rho_b$	0.48	0.47	0.000471	0.00471
uT_m	0.91	0.90	0.00304	0.00456
uH_2O	...	...	...	...

$$\frac{uf_s}{f_s} = \sqrt{\left(\frac{uP_b}{(P_b/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{100/(100 - H_2O)}\right)^2} = 0.00574$$

Uncertainty in volume @ STP due to volume correction factor uncertainty component (uVstd) & volume uncertainty component (uVm)

$$V_{std} = V_{measured} \times f_s = 0.00406$$

	Maximum m^3	**Minimum m^3**	**Sensitivity**	**Standard Uncertainty m^3**
Effect of uf_s	0.00408	0.00403	0.00447	0.0000256
Effect of uV_m	0.00416	0.00396	0.90	0.000101

$$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uf_s}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = 0.0000929$$

Uncertainty of correction factor to reference conditions (excluding oxygen contribution) & Uncertainty in final measurement @ reference conditions due to uncertainty component arrising from leak and/or loss (assumed 2% max) in the sample system (uL)

$$uL = \frac{Conc \times \frac{2}{100}}{\sqrt{3}}$$

	Tubes uL mg/Nm³	**Condensate uL mg/Nm³**
Speciated VOC	0.0142	...

$$Conc = \frac{M_{Recovered}}{V_m \times f_s \times f_{O_2}}$$

Uncertainty in final measurement @ Reference Conditions due to $uM_{Recovered}$

Charcoal Tube Results				
	Maximum mg/Nm³	**Minimum mg/Nm³**	**Sensitivity**	**Standard Uncertainty mg/Nm³**
Speciated VOC	1.85	0.62	246.43	0.62
Condensate Results				
	Maximum mg/Nm³	**Minimum mg/Nm³**	**Sensitivity**	**Standard Uncertainty mg/Nm³**
Speciated VOC				

Uncertainty in final measurement @ Reference Conditions due to uV_{STD}

Charcoal Tube Results				
	Maximum mg/Nm³	**Minimum mg/Nm³**	**Sensitivity**	**Standard Uncertainty mg/Nm³**
Speciated VOC	1.26	1.20	303.79	0.0282

Combined Uncertainty (excluding Oxygen contribution)

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{stp})^2}$$

Charcoal Tubes: Determinand	**Combined Uncertainty mg/Nm³**	**Expanded Uncertainty mg/Nm³**	**Measured Concentration mg/Nm³**	**Percent of Measured Concentration**
Speciated VOC	0.62	1.23	1.23	100.13

DEScycle at Leicester University			**Installation Name**	**: Reaction Vessel**
Permit No	**: ...**		**Visit Details**	**: Investigative Emissions – July 2025**
Variation No	**: ...**		**Survey Dates**	**: 1st July 2025**
Report Ref	**: P6125**	**: R001**	**Report Issue Date**	**: 20th August 2025**

Speciated VOC Uncertainty – Reaction Phase 1 – Test 2

Site: Descycle Ltd, Leicester University
Location: Materials Laboratory , Stack ID:Reaction Vessel

					Standard Uncertainty @ 95%		
Sampled Volume	V_m	0.00452	m^3	uV_m	0.0001	m^3
Meter Correction Factor or ml/count	**Yd**	0.989	...	...	...	...
Meter Temperature	T_m	299.33	k	uT_m	1.5	k
Barometric Pressure	ρ_b	1006.00	mBar		10.0	mBar
Oxygen content	$O_{2,m}$	20.90	%Vol	$uO_{2,m}$	1.25	%Vol
Moisture	H_2O	0.00	%Vol	uH_2O		%Vol

Tubes					
Determinand	**Recovered Mass**			**Standard Uncertainty**	
Speciated VOC	5.00	µg	**uM**	2.50	µg

Note: In the following calculations, the sensitivity coefficient (C) is estimated using $C_i = \frac{\partial f}{\partial x_i}$

For each factor, uncertainty is then calculated by Cu_i **where** C **is the sensitivity coefficient,** u **is the standard uncertainty and** i **is the index identifying the contributing factor e.g. i=uV$_m$, uT$_m$ etc.**

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = 1.00$$

Uncertainty in correction factor to STP due to measured barometric pressure uncertainty component (uρb), measured temperature of dry gas uncertainty component (uT$_m$) & measured moisture (uH$_2$O)

$$f_s = \frac{273}{T_m} \times \frac{\rho}{101.3} = 0.91$$

	Maximum	**Minimum**	**Sensitivity**	**ufstp**
uρ$_b$	0.48	0.47	0.000471	0.00471
uT$_m$	0.91	0.90	0.00303	0.00454
uH$_2$O	...	...	...	...

$$\frac{uf_s}{f_s} = \sqrt{\left(\frac{uP_b}{(P_b/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{100/(100 - H_2O)}\right)^2} = 0.00570$$

Uncertainty in volume @ STP due to volume correction factor uncertainty component (uVstd) & volume uncertainty component (uVm)

$$V_{std} = V_{measured} \times f_s = 0.00405$$

	Maximum m^3	**Minimum m^3**	**Sensitivity**	**Standard Uncertainty m^3**
Effect of uf$_s$	0.00407	0.00402	0.00447	0.0000255
Effect of uV$_m$	0.00415	0.00395	0.90	0.000101

$$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uf_s}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = 0.0000925$$

Uncertainty of correction factor to reference conditions (excluding oxygen contribution) & Uncertainty in final measurement @ reference conditions due to uncertainty component arrising from leak and/or loss (assumed 2% max) in the sample system (uL)

$$uL = \frac{Conc \times \frac{2}{100}}{\sqrt{3}}$$

	Tubes uL mg/Nm^3	**Condensate uL mg/Nm^3**
Speciated VOC	0.0143	...

$$Conc = \frac{M_{Recovered}}{V_m \times f_s \times f_{O_2}}$$

Uncertainty in final measurement @ Reference Conditions due to uM$_{Recovered}$

Charcoal Tube Results				
	Maximum mg/Nm^3	**Minimum mg/Nm^3**	**Sensitivity**	**Standard Uncertainty mg/Nm^3**
Speciated VOC	1.85	0.62	246.98	0.62
Condensate Results				
	Maximum mg/Nm^3	**Minimum mg/Nm^3**	**Sensitivity**	**Standard Uncertainty mg/Nm^3**
Speciated VOC				

Uncertainty in final measurement @ Reference Conditions due to uV$_{STD}$

Charcoal Tube Results				
	Maximum mg/Nm^3	**Minimum mg/Nm^3**	**Sensitivity**	**Standard Uncertainty mg/Nm^3**
Speciated VOC	1.26	1.21	305.15	0.0282

Combined Uncertainty (excluding Oxygen contribution)

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{stp})^2}$$

Charcoal Tubes: Determinand	**Combined Uncertainty mg/Nm^3**	**Expanded Uncertainty mg/Nm^3**	**Measured Concentration mg/Nm^3**	**Percent of Measured Concentration**
Speciated VOC	0.62	1.24	1.23	100.13

DEScycle at Leicester University			**Installation Name**	**: Reaction Vessel**
Permit No	**: ...**		**Visit Details**	**: Investigative Emissions – July 2025**
Variation No	**: ...**		**Survey Dates**	**: 1st July 2025**
Report Ref	**: P6125**	**: R001**	**Report Issue Date**	**: 20th August 2025**

Speciated VOC Uncertainty – Reaction Phase 2 – Test 1

Site: Descycle Ltd, Leicester University
Location: Materials Laboratory , Stack ID:Reaction Vessel

					Standard Uncertainty @ 95%		
Sampled Volume	V_m	0.00449	m^3	uV_m	0.0001	m^3
Meter Correction Factor or ml/count	**Yd**	0.989	...	...	...	...
Meter Temperature	T_m	300.00	k	uT_m	1.5	k
Barometric Pressure	ρ_b	1006.00	mBar		10.0	mBar
Oxygen content	$O_{2,m}$	20.90	%Vol	$uO_{2,m}$	1.25	%Vol
Moisture	H_2O	0.00	%Vol	uH_2O		%Vol

Tubes					
Determinand	**Recovered Mass**			**Standard Uncertainty**	
Speciated VOC	5.00	µg	**uM**	2.50	µg

Note: In the following calculations, the sensitivity coefficient (C) is estimated using $C_i = \frac{\partial f}{\partial x_i}$

For each factor, uncertainty is then calculated by Cu_i **where** C **is the sensitivity coefficient,** u **is the standard uncertainty and** i **is the index identifying the contributing factor e.g. i=uV_m, uT_m etc.**

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = \quad 1.00$$

Uncertainty in correction factor to STP due to measured barometric pressure uncertainty component (up_b), measured temperature of dry gas uncertainty component (uT_m) & measured moisture (uH_2O)

$$f_s = \frac{273}{T_m} \times \frac{\rho}{101.3} = \quad 0.90$$

	Maximum	Minimum	Sensitivity	ufstp
up_b	0.48	0.47	0.000470	0.00470
uT_m	0.91	0.90	0.00301	0.00452
uH_2O	...	...	...	...

$$\frac{uf_s}{f_s} = \sqrt{\left(\frac{uP_b}{(P_b/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{100/(100 - H_2O)}\right)^2} = \quad 0.00567$$

Uncertainty in volume @ STP due to volume correction factor uncertainty component (uVstd) & volume uncertainty component (uVm)

$$V_{std} = V_{measured} \times f_s = \quad 0.00401$$

	Maximum m^3	Minimum m^3	Sensitivity	Standard Uncertainty m^3
Effect of uf_s	0.00404	0.00399	0.00444	0.0000252
Effect of uV_m	0.00411	0.00391	0.89	0.000100

$$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uf_s}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = \quad 0.0000914$$

Uncertainty of correction factor to reference conditions (excluding oxygen contribution) & Uncertainty in final measurement @ reference conditions due to uncertainty component arrising from leak and/or loss (assumed 2% max) in the sample system (uL)

$$uL = \frac{Conc \times \frac{2}{100}}{\sqrt{3}}$$

	Tubes uL mg/Nm³	Condensate uL mg/Nm³
Speciated VOC	0.0144	...

$$Conc = \frac{M_{Recovered}}{V_m \times f_s \times f_{O_2}}$$

Uncertainty in final measurement @ Reference Conditions due to $uM_{Recovered}$

Charcoal Tube Results				
	Maximum mg/Nm³	**Minimum mg/Nm³**	**Sensitivity**	**Standard Uncertainty mg/Nm³**
Speciated VOC	1.87	0.62	249.18	0.62

Condensate Results				
	Maximum mg/Nm³	**Minimum mg/Nm³**	**Sensitivity**	**Standard Uncertainty mg/Nm³**
Speciated VOC				

Uncertainty in final measurement @ Reference Conditions due to uV_{STD}

Charcoal Tube Results				
	Maximum mg/Nm³	**Minimum mg/Nm³**	**Sensitivity**	**Standard Uncertainty mg/Nm³**
Speciated VOC	1.27	1.22	310.61	0.0284

Combined Uncertainty (excluding Oxygen contribution)

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{stp})^2}$$

Charcoal Tubes: Determinand	Combined Uncertainty mg/Nm³	Expanded Uncertainty mg/Nm³	Measured Concentration mg/Nm³	Percent of Measured Concentration
Speciated VOC	0.62	1.25	1.25	100.13

DEScycle at Leicester University			**Installation Name**	**: Reaction Vessel**
Permit No	**: ...**		**Visit Details**	**: Investigative Emissions – July 2025**
Variation No	**: ...**		**Survey Dates**	**: 1st July 2025**
Report Ref	**: P6125**	**: R001**	**Report Issue Date**	**: 20th August 2025**

Speciated VOC Uncertainty – Reaction Phase 2 – Test 2

Site: Descycle Ltd, Leicester University
Location: Materials Laboratory , Stack ID:Reaction Vessel

					Standard Uncertainty @ 95%		
Sampled Volume	V_m	0.00450	m^3	uV_m	0.0001	m^3
Meter Correction Factor or ml/count	**Yd**	0.989	...	...	...	...
Meter Temperature	T_m	302.00	k	uT_m	1.5	k
Barometric Pressure	ρ_b	1006.00	mBar		10.0	mBar
Oxygen content	$O_{2,m}$	20.90	%Vol	$uO_{2,m}$	1.25	%Vol
Moisture	H_2O	0.00	%Vol	uH_2O		%Vol

Tubes					
Determinand	**Recovered Mass**			**Standard Uncertainty**	
Speciated VOC	5.00	µg	**uM**	2.50	µg

Note: In the following calculations, the sensitivity coefficient (C) is estimated using: $C_i = \frac{\partial f}{\partial x_i}$

For each factor, uncertainty is then calculated by $C u_i$ **where** C **is the sensitivity coefficient,** u **is the standard uncertainty and** i **is the index identifying the contributing factor e.g. i=uV_m, uT_m etc.**

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = \quad 1.00$$

Uncertainty in correction factor to STP due to measured barometric pressure uncertainty component ($u\rho b$), measured temperature of dry gas uncertainty component (uT_m) & measured moisture (uH_2O)

$$f_s = \frac{273}{T_m} \times \frac{\rho}{101.3} = \quad 0.90$$

	Maximum	Minimum	Sensitivity	ufstp
$u\rho_b$	0.48	0.47	0.000469	0.00469
uT_m	0.90	0.89	0.00297	0.00446
uH_2O	...	...	...	...

$$\frac{uf_s}{f_s} = \sqrt{\left(\frac{uP_b}{(P_b/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{100/(100 - H_2O)}\right)^2} = \quad 0.00557$$

Uncertainty in volume @ STP due to volume correction factor uncertainty component (uVstd) & volume uncertainty component (uVm)

$$V_{std} = V_{measured} \times f_s = \quad 0.00400$$

	Maximum m^3	Minimum m^3	Sensitivity	Standard Uncertainty m^3
Effect of uf_s	0.00402	0.00397	0.00445	0.0000248
Effect of uV_m	0.00410	0.00390	0.89	0.0000999

$$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uf_s}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = \quad 0.0000904$$

Uncertainty of correction factor to reference conditions (excluding oxygen contribution) & Uncertainty in final measurement @ reference conditions due to uncertainty component arrising from leak and/or loss (assumed 2% max) in the sample system (uL)

$$uL = \frac{Conc \times \frac{2}{100}}{\sqrt{3}}$$

	Tubes uL mg/Nm³	Condensate uL mg/Nm³
Speciated VOC	0.0145	...

$$Conc = \frac{M_{Recovered}}{V_m \times f_s \times f_{O_2}}$$

Uncertainty in final measurement @ Reference Conditions due to $uM_{Recovered}$

Charcoal Tube Results				
	Maximum mg/Nm³	Minimum mg/Nm³	Sensitivity	Standard Uncertainty mg/Nm³
Speciated VOC	1.88	0.63	250.28	0.63
Condensate Results				
	Maximum mg/Nm³	Minimum mg/Nm³	Sensitivity	Standard Uncertainty mg/Nm³
Speciated VOC				

Uncertainty in final measurement @ Reference Conditions due to uV_{STD}

Charcoal Tube Results				
	Maximum mg/Nm³	Minimum mg/Nm³	Sensitivity	Standard Uncertainty mg/Nm³
Speciated VOC	1.28	1.22	313.37	0.0283

Combined Uncertainty (excluding Oxygen contribution)

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{stp})^2}$$

Charcoal Tubes: Determinand	Combined Uncertainty mg/Nm³	Expanded Uncertainty mg/Nm³	Measured Concentration mg/Nm³	Percent of Measured Concentration
Speciated VOC	0.63	1.25	1.25	100.13

DEScycle at Leicester University			Installation Name	: Reaction Vessel
Permit No	: ...		Visit Details	: Investigative Emissions – July 2025
Variation No	: ...		Survey Dates	: 1st July 2025
Report Ref	: P6125	: R001	Report Issue Date	: 20th August 2025

Speciated VOC Uncertainty – Reaction Phase 3 – Test 1

Site: Descycle Ltd, Leicester University
Location: Materials Laboratory , Stack ID:Reaction Vessel

					Standard Uncertainty @ 95%		
Sampled Volume	V_m	0.00450	m^3	uV_m	0.0001	m^3
Meter Correction Factor or ml/count	Yd	0.989	...	...	...	...
Meter Temperature	T_m	302.00	k	uT_m	1.5	k
Barometric Pressure	ρ_b	1006.00	mBar		10.0	mBar
Oxygen content	$O_{2,m}$	20.90	%Vol	$uO_{2,m}$	1.25	%Vol
Moisture	H_2O	0.00	%Vol	uH_2O		%Vol

Tubes					
Determinand	Recovered Mass			Standard Uncertainty	
Acetone	50.90	µg	uM	2.55	µg

Note: In the following calculations, the sensitivity coefficient (C) is estimated using $C_i = \frac{\partial f}{\partial x_i}$

For each factor, uncertainty is then calculated by $C_i u_i$ **where** C **is the sensitivity coefficient,** u **is the standard uncertainty and** i **is the index identifying the contributing factor e.g. i=uV_m, uT_m etc.**

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = 1.00$$

Uncertainty in correction factor to STP due to measured barometric pressure uncertainty component (up_b), measured temperature of dry gas uncertainty component (uT_m) & measured moisture (uH_2O)

$$f_s = \frac{273}{T_m} \times \frac{\rho}{101.3} = 0.90$$

	Maximum	Minimum	Sensitivity	ufstp
up_b	0.48	0.47	0.000469	0.00469
uT_m	0.90	0.89	0.00297	0.00446
uH_2O	...	...	...	...

$$\frac{uf_s}{f_s} = \sqrt{\left(\frac{uP_b}{(P_b/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{100/(100 - H_2O)}\right)^2} = 0.00557$$

Uncertainty in volume @ STP due to volume correction factor uncertainty component (uVstd) & volume uncertainty component (uVm)

$$V_{std} = V_{measured} \times f_s = 0.00400$$

	Maximum m^3	Minimum m^3	Sensitivity	Standard Uncertainty m^3
Effect of uf_s	0.00402	0.00397	0.00445	0.0000248
Effect of uV_m	0.00410	0.00390	0.89	0.0000999

$$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uf_s}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = 0.0000904$$

Uncertainty of correction factor to reference conditions (excluding oxygen contribution) & Uncertainty in final measurement @ reference conditions due to uncertainty component arrising from leak and/or loss (assumed 2% max) in the sample system (uL)

$$uL = \frac{Conc \times \frac{2}{100}}{\sqrt{3}}$$

	Tubes uL mg/Nm³	Condensate uL mg/Nm³
Acetone	0.15	...

$$Conc = \frac{M_{Recovered}}{V_m \times f_s \times f_{O_2}}$$

Uncertainty in final measurement @ Reference Conditions due to $uM_{Recovered}$

Charcoal Tube Results				
	Maximum mg/Nm³	Minimum mg/Nm³	Sensitivity	Standard Uncertainty mg/Nm³
Acetone	13.38	12.10	250.28	0.64
Condensate Results				
	Maximum mg/Nm³	Minimum mg/Nm³	Sensitivity	Standard Uncertainty mg/Nm³
Acetone				

Uncertainty in final measurement @ Reference Conditions due to uV_{STD}

Charcoal Tube Results				
	Maximum mg/Nm³	Minimum mg/Nm³	Sensitivity	Standard Uncertainty mg/Nm³
Acetone	13.03	12.46	3190.11	0.29

Combined Uncertainty (excluding Oxygen contribution)

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{stp})^2}$$

Charcoal Tubes: Determinand	Combined Uncertainty mg/Nm³	Expanded Uncertainty mg/Nm³	Measured Concentration mg/Nm³	Percent of Measured Concentration
Acetone	0.71	1.43	12.74	11.22

DEScycle at Leicester University			Installation Name	: Reaction Vessel
Permit No	: ...		Visit Details	: Investigative Emissions – July 2025
Variation No	: ...		Survey Dates	: 1st July 2025
Report Ref	: P6125	: R001	Report Issue Date	: 20th August 2025

Speciated VOC Uncertainty – Reaction Phase 3 – Test 2

Site: Descycle Ltd, Leicester University
Location: Materials Laboratory , Stack ID:Reaction Vessel

					Standard Uncertainty @ 95%		
Sampled Volume	V_m	0.00452	m^3	uV_m	0.0001	m^3
Meter Correction Factor or ml/count	Yd	0.989	...	...	...	...
Meter Temperature	T_m	302.00	k	uT_m	1.5	k
Barometric Pressure	ρ_b	1006.00	mBar		10.0	mBar
Oxygen content	$O_{2,m}$	20.90	%Vol	$uO_{2,m}$	1.25	%Vol
Moisture	H_2O	0.00	%Vol	uH_2O		%Vol

Tubes					
Determinand	Recovered Mass			Standard Uncertainty	
Acetone	26.70	µg	uM	1.34	µg

Note: In the following calculations, the sensitivity coefficient (C) is estimated using $C_i = \frac{\partial f}{\partial x_i}$

For each factor, uncertainty is then calculated by Cu_i **where** C **is the sensitivity coefficient,** u **is the standard uncertainty and** i **is the index identifying the contributing factor e.g. i=uV_m, uT_m etc.**

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = \quad 1.00$$

Uncertainty in correction factor to STP due to measured barometric pressure uncertainty component (up_b), measured temperature of dry gas uncertainty component (uT_m) & measured moisture (uH_2O)

$$f_s = \frac{273}{T_m} \times \frac{\rho}{101.3} = \quad 0.90$$

	Maximum	Minimum	Sensitivity	ufstp
up_b	0.48	0.47	0.000469	0.00469
uT_m	0.90	0.89	0.00297	0.00446
uH_2O	...	...	...	...

$$\frac{uf_s}{f_s} = \sqrt{\left(\frac{uP_b}{(P_b/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{100/(100 - H_2O)}\right)^2} = \quad 0.00557$$

Uncertainty in volume @ STP due to volume correction factor uncertainty component (uVstd) & volume uncertainty component (uVm)

$$V_{std} = V_{measured} \times f_s = \quad 0.00401$$

	Maximum m^3	Minimum m^3	Sensitivity	Standard Uncertainty m^3
Effect of uf_s	0.00404	0.00399	0.00447	0.0000249
Effect of uV_m	0.00411	0.00391	0.89	0.000100

$$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uf_s}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = \quad 0.0000909$$

Uncertainty of correction factor to reference conditions (excluding oxygen contribution) & Uncertainty in final measurement @ reference conditions due to uncertainty component arrising from leak and/or loss (assumed 2% max) in the sample system (uL)

$$uL = \frac{Conc \times \frac{2}{100}}{\sqrt{3}}$$

	Tubes uL mg/Nm³	Condensate uL mg/Nm³
Acetone	0.0768	...

$$Conc = \frac{M_{Recovered}}{V_m \times f_s \times f_{O_2}}$$

Uncertainty in final measurement @ Reference Conditions due to $uM_{Recovered}$

Charcoal Tube Results				
	Maximum mg/Nm³	Minimum mg/Nm³	Sensitivity	Standard Uncertainty mg/Nm³
Acetone	6.99	6.32	249.18	0.33
Condensate Results				
	Maximum mg/Nm³	Minimum mg/Nm³	Sensitivity	Standard Uncertainty mg/Nm³
Acetone				

Uncertainty in final measurement @ Reference Conditions due to uV_{STD}

Charcoal Tube Results				
	Maximum mg/Nm³	Minimum mg/Nm³	Sensitivity	Standard Uncertainty mg/Nm³
Acetone	6.81	6.51	1658.62	0.15

Combined Uncertainty (excluding Oxygen contribution)

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{stp})^2}$$

Charcoal Tubes: Determinand	Combined Uncertainty mg/Nm³	Expanded Uncertainty mg/Nm³	Measured Concentration mg/Nm³	Percent of Measured Concentration
Acetone	0.37	0.75	6.65	11.22

DEScycle at Leicester University		**Installation Name**	**: Reaction Vessel**
Permit No	**: ...**	**Visit Details**	**: Investigative Emissions – July 2025**
Variation No	**: ...**	**Survey Dates**	**: 1st July 2025**
Report Ref	**: P6125 : R001**	**Report Issue Date**	**: 20th August 2025**

Acids Screen Uncertainty – Reaction Phase 1 – Test 1

Site: Descycle Ltd, Leicester University
Location: Materials Laboratory , Stack ID:Reaction Vessel

					Standard Uncertainty @ 95%		
Sampled Volume	V_m	0.00451	m^3	uV_m	0.0001	m^3
Meter Correction Factor or ml/count	Yd	0.996	...	...	...	...
Meter Temperature	T_m	298.67	k	uT_m	1.5	k
Barometric Pressure	ρ_b	1006.00	mBar		10.0	mBar
Oxygen content	$O_{2,m}$	20.90	%Vol	$uO_{2,m}$	1.25	%Vol
Moisture	H_2O	0.00	%Vol	uH_2O		%Vol

Tubes					
Determinand	Recovered Mass			Standard Uncertainty	
Hydrofluoric Acid	5.00	µg	uM	2.50	µg
Hydrochloric Acid	1.00	µg	uM	0.50	µg
Nitric Acid	2.00	µg	uM	1.00	µg
Phosphoric Acid	6.00	µg	uM	3.00	µg
Sulphuric Acid	2.00	µg	uM	1.00	µg
Hydrogen Bromide	2.00	µg	uM	1.00	µg

Note: In the following calculations, the sensitivity coefficient (C) is estimated using $C_i = \frac{\partial f}{\partial x_i}$

For each factor, uncertainty is then calculated by Cu_i **where** C **is the sensitivity coefficient,** u **is the standard uncertainty and** i **is the index identifying the contributing factor e.g. i=uV$_m$, uT$_m$ etc.**

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = \quad 1.00$$

Uncertainty in correction factor to STP due to measured barometric pressure uncertainty component (upb), measured temperature of dry gas uncertainty component (uT$_m$) & measured moisture (uH$_2$O)

$$f_s = \frac{273}{T_m} \times \frac{\rho}{101.3} = \quad 0.91$$

	Maximum	Minimum	Sensitivity	ufstp
up_b	0.48	0.47	0.000471	0.00471
uT_m	0.91	0.90	0.00304	0.00456
uH_2O	...	...	...	...

$$\frac{uf_s}{f_s} = \sqrt{\left(\frac{up_b}{(P_b/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{100/(100 - H_2O)}\right)^2} = \quad 0.00574$$

Uncertainty in volume @ STP due to volume correction factor uncertainty component (uVstd) & volume uncertainty component (uVm)

$$V_{std} = V_{measured} \times f_s = \quad 0.00408$$

	Maximum m^3	Minimum m^3	Sensitivity	Standard Uncertainty m^3
Effect of uf$_s$	0.00410	0.00405	0.00449	0.0000258
Effect of uV$_m$	0.00418	0.00398	0.90	0.000102

$$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uf_s}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = \quad 0.0000940$$

Uncertainty of correction factor to reference conditions (excluding oxygen contribution) & Uncertainty in final measurement @ reference conditions due to uncertainty component arrising from leak and/or loss (assumed 2% max) in the sample system (uL)

$$uL = \frac{Conc \times \frac{2}{100}}{\sqrt{3}}$$

	Tubes uL mg/Nm^3	Condensate uL mg/Nm^3
Hydrofluoric Acid	0.0142	...
Hydrochloric Acid	0.00283	...
Nitric Acid	0.00566	...
Phosphoric Acid	0.0170	...
Sulphuric Acid	0.00566	...
Hydrogen Bromide	0.00566	...

$$Conc = \frac{M_{Recovered}}{V_m \times f_s \times f_{O_2}}$$

Uncertainty in final measurement @ Reference Conditions due to uM$_{Recovered}$

Charcoal Tube Results				
	Maximum mg/Nm^3	Minimum mg/Nm^3	Sensitivity	Standard Uncertainty mg/Nm^3
Hydrofluoric Acid	1.84	0.61	245.24	0.61
Hydrochloric Acid	0.37	0.12	245.24	0.12
Nitric Acid	0.74	0.25	245.24	0.25
Phosphoric Acid	2.21	0.74	245.24	0.74
Sulphuric Acid	0.74	0.25	245.24	0.25
Hydrogen Bromide	0.74	0.25	245.24	0.25

Condensate Results				
	Maximum mg/Nm^3	Minimum mg/Nm^3	Sensitivity	Standard Uncertainty mg/Nm^3
Hydrofluoric Acid				
Hydrochloric Acid				
Nitric Acid				
Phosphoric Acid				
Sulphuric Acid				
Hydrogen Bromide				

Uncertainty in final measurement @ Reference Conditions due to uV$_{STD}$

Charcoal Tube Results				
	Maximum mg/Nm^3	Minimum mg/Nm^3	Sensitivity	Standard Uncertainty mg/Nm^3
Hydrofluoric Acid	1.26	1.20	300.87	0.0283
Hydrochloric Acid	0.25	0.24	60.17	0.00565
Nitric Acid	0.50	0.48	120.35	0.0113
Phosphoric Acid	1.51	1.44	361.04	0.0339
Sulphuric Acid	0.50	0.48	120.35	0.0113
Hydrogen Bromide	0.50	0.48	120.35	0.0113

Combined Uncertainty (excluding Oxygen contribution)

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{stp})^2}$$

Charcoal Tubes: Determinand	Combined Uncertainty mg/Nm^3	Expanded Uncertainty mg/Nm^3	Measured Concentration mg/Nm^3	Percent of Measured Concentration
Hydrofluoric Acid	0.61	1.23	1.23	100.13
Hydrochloric Acid	0.12	0.25	0.25	100.13
Nitric Acid	0.25	0.49	0.49	100.13
Phosphoric Acid	0.74	1.47	1.47	100.13
Sulphuric Acid	0.25	0.49	0.49	100.13
Hydrogen Bromide	0.25	0.49	0.49	100.13

DEScycle at Leicester University		**Installation Name**	**: Reaction Vessel**
Permit No	**: ...**	**Visit Details**	**: Investigative Emissions – July 2025**
Variation No	**: ...**	**Survey Dates**	**: 1st July 2025**
Report Ref	**: P6125 : R001**	**Report Issue Date**	**: 20th August 2025**

Acids Screen Uncertainty – Reaction Phase 1 – Test 2

Site: Descycle Ltd, Leicester University
Location: Materials Laboratory , Stack ID:Reaction Vessel

				Standard Uncertainty @ 95%		
Sampled Volume	V_m	0.00442	m^3	uV_m	0.0001	m^3
Meter Correction Factor or ml/count	Yd	0.996	...	...	...	...
Meter Temperature	T_m	299.33	k	uT_m	1.5	k
Barometric Pressure	ρ_b	1006.00	mBar		10.0	mBar
Oxygen content	$O_{2,m}$	20.90	%Vol	$uO_{2,m}$	1.25	%Vol
Moisture	H_2O	0.00	%Vol	uH_2O		%Vol

Tubes					
Determinand	Recovered Mass			Standard Uncertainty	
Hydrofluoric Acid	5.00	µg	uM	2.50	µg
Hydrochloric Acid	1.00	µg	uM	0.50	µg
Nitric Acid	2.00	µg	uM	1.00	µg
Phosphoric Acid	6.00	µg	uM	3.00	µg
Sulphuric Acid	2.00	µg	uM	1.00	µg
Hydrogen Bromide	2.00	µg	uM	1.00	µg

Note: In the following calculations, the sensitivity coefficient (C) is estimated using: $C_i = \frac{\partial f}{\partial x_i}$

For each factor, uncertainty is then calculated by $C_i u_i$ where C is the sensitivity coefficient, u is the standard uncertainty and i is the index identifying the contributing factor e.g. i=uV_m, uT_m etc.

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = 1.00$$

Uncertainty in correction factor to STP due to measured barometric pressure uncertainty component (uρb), measured temperature of dry gas uncertainty component (uT_m) & measured moisture (uH_2O)

$$f_s = \frac{273}{T_m} \times \frac{\rho}{101.3} = 0.91$$

	Maximum	Minimum	Sensitivity	ufstp
up_b	0.48	0.47	0.000471	0.00471
uT_m	0.91	0.90	0.00303	0.00454
uH_2O	...	...	...	...

$$\frac{uf_s}{f_s} = \sqrt{\left(\frac{uP_b}{(P_b/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{100/(100 - H_2O)}\right)^2} = 0.00570$$

Uncertainty in volume @ STP due to volume correction factor uncertainty component (uVstd) & volume uncertainty component (uVm)

$$V_{std} = V_{measured} \times f_s = 0.00399$$

	Maximum m^3	Minimum m^3	Sensitivity	Standard Uncertainty m^3
Effect of uf_s	0.00401	0.00396	0.00440	0.0000251
Effect of uV_m	0.00409	0.00389	0.90	0.0000997

$$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uf_s}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = 0.0000916$$

Uncertainty of correction factor to reference conditions (excluding oxygen contribution) & Uncertainty in final measurement @ reference conditions due to uncertainty component arrising from leak and/or loss (assumed 2% max) in the sample system (uL)

$$uL = \frac{Conc \times \frac{2}{100}}{\sqrt{3}}$$

	Tubes uL mg/Nm³	Condensate uL mg/Nm³
Hydrofluoric Acid	0.0145	...
Hydrochloric Acid	0.00290	...
Nitric Acid	0.00579	...
Phosphoric Acid	0.0174	...
Sulphuric Acid	0.00579	...
Hydrogen Bromide	0.00579	...

$$Conc = \frac{M_{Recovered}}{V_m \times f_s \times f_{O_2}}$$

Uncertainty in final measurement @ Reference Conditions due to $uM_{Recovered}$

Charcoal Tube Results

	Maximum mg/Nm³	Minimum mg/Nm³	Sensitivity	Standard Uncertainty mg/Nm³
Hydrofluoric Acid	1.88	0.63	250.79	0.63
Hydrochloric Acid	0.38	0.13	250.79	0.13
Nitric Acid	0.75	0.25	250.79	0.25
Phosphoric Acid	2.26	0.75	250.79	0.75
Sulphuric Acid	0.75	0.25	250.79	0.25
Hydrogen Bromide	0.75	0.25	250.79	0.25

Condensate Results

	Maximum mg/Nm³	Minimum mg/Nm³	Sensitivity	Standard Uncertainty mg/Nm³
Hydrofluoric Acid				
Hydrochloric Acid				
Nitric Acid				
Phosphoric Acid				
Sulphuric Acid				
Hydrogen Bromide				

Uncertainty in final measurement @ Reference Conditions due to uV_{STD}

Charcoal Tube Results

	Maximum mg/Nm³	Minimum mg/Nm³	Sensitivity	Standard Uncertainty mg/Nm³
Hydrofluoric Acid	1.28	1.23	314.64	0.0288
Hydrochloric Acid	0.26	0.25	62.93	0.00577
Nitric Acid	0.51	0.49	125.86	0.0115
Phosphoric Acid	1.54	1.47	377.57	0.0346
Sulphuric Acid	0.51	0.49	125.86	0.0115
Hydrogen Bromide	0.51	0.49	125.86	0.0115

Combined Uncertainty (excluding Oxygen contribution)

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{stp})^2}$$

Charcoal Tubes: Determinand	Combined Uncertainty mg/Nm³	Expanded Uncertainty mg/Nm³	Measured Concentration mg/Nm³	Percent of Measured Concentration
Hydrofluoric Acid	0.63	1.26	1.25	100.13
Hydrochloric Acid	0.13	0.25	0.25	100.13
Nitric Acid	0.25	0.50	0.50	100.13
Phosphoric Acid	0.75	1.51	1.50	100.13
Sulphuric Acid	0.25	0.50	0.50	100.13
Hydrogen Bromide	0.25	0.50	0.50	100.13

DEScycle at Leicester University		**Installation Name**	**: Reaction Vessel**
Permit No	**: ...**	**Visit Details**	**: Investigative Emissions – July 2025**
Variation No	**: ...**	**Survey Dates**	**: 1st July 2025**
Report Ref	**: P6125 : R001**	**Report Issue Date**	**: 20th August 2025**

Acids Screen Uncertainty – Reaction Phase 2 – Test 1

Site: Descycle Ltd, Leicester University
Location: Materials Laboratory , Stack ID:Reaction Vessel

					Standard Uncertainty @ 95%		
Sampled Volume	V_m	0.00450	m³		uV_m	0.0001	m³
Meter Correction Factor or ml/count	Yd	0.996	...		...	...	...
Meter Temperature	T_m	300.00	k		uT_m	1.5	k
Barometric Pressure	p_b	1006.00	mBar			10.0	mBar
Oxygen content	$O_{2,m}$	20.90	%Vol		$uO_{2,m}$	1.25	%Vol
Moisture	H_2O	0.00	%Vol		uH_2O		%Vol

Tubes					
Determinand	Recovered Mass		Standard Uncertainty		
Hydrofluoric Acid	5.00	µg	uM	2.50	µg
Hydrochloric Acid	1.00	µg	uM	0.50	µg
Nitric Acid	2.00	µg	uM	1.00	µg
Phosphoric Acid	6.00	µg	uM	3.00	µg
Sulphuric Acid	2.00	µg	uM	1.00	µg
Hydrogen Bromide	2.00	µg	uM	1.00	µg

Note: In the following calculations, the sensitivity coefficient (C) is estimated using $C_i = \frac{\partial f}{\partial x_i}$

For each factor, uncertainty is then calculated by $u_i = C_i u_i$ where C is the sensitivity coefficient, u is the standard uncertainty and i is the index identifying the contributing factor e.g. i=uV_m, uT_m etc.

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = 1.00$$

Uncertainty in correction factor to STP due to measured barometric pressure uncertainty component (upb), measured temperature of dry gas uncertainty component (uT_m) & measured moisture (uH_2O)

$$f_s = \frac{273}{T_m} \times \frac{\rho}{101.3} = 0.90$$

	Maximum	Minimum	Sensitivity	ufstp
up_b	0.48	0.47	0.000470	0.00470
uT_m	0.91	0.90	0.00301	0.00452
uH_2O	...	...	...	...

$$\frac{uf_s}{f_s} = \sqrt{\left(\frac{up_b}{(P_b/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{100/(100 - H_2O)}\right)^2} = 0.00567$$

Uncertainty in volume @ STP due to volume correction factor uncertainty component (uVstd) & volume uncertainty component (uVm)

$$V_{std} = V_{measured} \times f_s = 0.00405$$

	Maximum m³	Minimum m³	Sensitivity	Standard Uncertainty m³
Effect of uf_s	0.00408	0.00403	0.00448	0.0000254
Effect of uV_m	0.00415	0.00395	0.90	0.000101

$$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uf_s}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = 0.0000929$$

Uncertainty of correction factor to reference conditions (excluding oxygen contribution) & Uncertainty in final measurement @ reference conditions due to uncertainty component arrising from leak and/or loss (assumed 2% max) in the sample system (uL)

$$uL = \frac{Conc \times \frac{2}{100}}{\sqrt{3}}$$

	Tubes uL mg/Nm³	Condensate uL mg/Nm³
Hydrofluoric Acid	0.0143	...
Hydrochloric Acid	0.00285	...
Nitric Acid	0.00570	...
Phosphoric Acid	0.0171	...
Sulphuric Acid	0.00570	...
Hydrogen Bromide	0.00570	...

$$Conc = \frac{M_{Recovered}}{V_m \times f_s \times f_{O_2}}$$

Uncertainty in final measurement @ Reference Conditions due to $uM_{Recovered}$

Charcoal Tube Results

	Maximum mg/Nm³	Minimum mg/Nm³	Sensitivity	Standard Uncertainty mg/Nm³
Hydrofluoric Acid	1.85	0.62	246.88	0.62
Hydrochloric Acid	0.37	0.12	246.88	0.12
Nitric Acid	0.74	0.25	246.88	0.25
Phosphoric Acid	2.22	0.74	246.88	0.74
Sulphuric Acid	0.74	0.25	246.88	0.25
Hydrogen Bromide	0.74	0.25	246.88	0.25

Condensate Results

	Maximum mg/Nm³	Minimum mg/Nm³	Sensitivity	Standard Uncertainty mg/Nm³
Hydrofluoric Acid				
Hydrochloric Acid				
Nitric Acid				
Phosphoric Acid				
Sulphuric Acid				
Hydrogen Bromide				

Uncertainty in final measurement @ Reference Conditions due to uV_{STD}

Charcoal Tube Results

	Maximum mg/Nm³	Minimum mg/Nm³	Sensitivity	Standard Uncertainty mg/Nm³
Hydrofluoric Acid	1.26	1.21	304.91	0.0283
Hydrochloric Acid	0.25	0.24	60.98	0.00567
Nitric Acid	0.51	0.48	121.96	0.0113
Phosphoric Acid	1.52	1.45	365.89	0.0340
Sulphuric Acid	0.51	0.48	121.96	0.0113
Hydrogen Bromide	0.51	0.48	121.96	0.0113

Combined Uncertainty (excluding Oxygen contribution)

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{stp})^2}$$

Charcoal Tubes: Determinand	Combined Uncertainty mg/Nm³	Expanded Uncertainty mg/Nm³	Measured Concentration mg/Nm³	Percent of Measured Concentration
Hydrofluoric Acid	0.62	1.24	1.23	100.13
Hydrochloric Acid	0.12	0.25	0.25	100.13
Nitric Acid	0.25	0.49	0.49	100.13
Phosphoric Acid	0.74	1.48	1.48	100.13
Sulphuric Acid	0.25	0.49	0.49	100.13
Hydrogen Bromide	0.25	0.49	0.49	100.13

DEScycle at Leicester University		**Installation Name**	**: Reaction Vessel**
Permit No	**: ...**	**Visit Details**	**: Investigative Emissions – July 2025**
Variation No	**: ...**	**Survey Dates**	**: 1st July 2025**
Report Ref	**: P6125 : R001**	**Report Issue Date**	**: 20th August 2025**

Acids Screen Uncertainty – Reaction Phase 2 – Test 2

Site: Descycle Ltd, Leicester University
Location: Materials Laboratory , Stack ID:Reaction Vessel

					Standard Uncertainty @ 95%		
Sampled Volume	V_m	0.00450	m^3		uV_m	0.0001	m^3
Meter Correction Factor or ml/count	**Yd**	0.996	...		...	...	...
Meter Temperature	T_m	302.00	k		uT_m	1.5	k
Barometric Pressure	ρ_b	1006.00	mBar			10.0	mBar
Oxygen content	$O_{2,m}$	20.90	%Vol		$uO_{2,m}$	1.25	%Vol
Moisture	H_2O	0.00	%Vol		uH_2O		%Vol

Tubes					
Determinand	**Recovered Mass**		**Standard Uncertainty**		
Hydrofluoric Acid	5.00	µg	**uM**	2.50	µg
Hydrochloric Acid	1.00	µg	**uM**	0.50	µg
Nitric Acid	2.00	µg	**uM**	1.00	µg
Phosphoric Acid	6.00	µg	**uM**	3.00	µg
Sulphuric Acid	2.00	µg	**uM**	1.00	µg
Hydrogen Bromide	2.00	µg	**uM**	1.00	µg

Note: In the following calculations, the sensitivity coefficient (C) is estimated using $C_i = \frac{\partial f}{\partial x_i}$

For each factor, uncertainty is then calculated by $C_i u_i$ **where** C **is the sensitivity coefficient,** u **is the standard uncertainty and** i **is the index identifying the contributing factor e.g. i=uV_m, uT_m etc.**

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = 1.00$$

Uncertainty in correction factor to STP due to measured barometric pressure uncertainty component (upb), measured temperature of dry gas uncertainty component (uT_m) & measured moisture (uH_2O)

$$f_s = \frac{273}{T_m} \times \frac{\rho}{101.3} = 0.90$$

	Maximum	**Minimum**	**Sensitivity**	**ufstp**
up_b	0.48	0.47	0.000469	0.00469
uT_m	0.90	0.89	0.00297	0.00446
uH_2O	...	...	...	...

$$\frac{uf_s}{f_s} = \sqrt{\left(\frac{uP_b}{(P_b/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{100/(100 - H_2O)}\right)^2} = 0.00557$$

Uncertainty in volume @ STP due to volume correction factor uncertainty component (uVstd) & volume uncertainty component (uVm)

$$V_{std} = V_{measured} \times f_s = 0.00402$$

	Maximum m^3	**Minimum m^3**	**Sensitivity**	**Standard Uncertainty m^3**
Effect of uf_s	0.00405	0.00400	0.00448	0.0000250
Effect of uV_m	0.00412	0.00392	0.89	0.000101

$$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uf_s}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = 0.0000917$$

Uncertainty of correction factor to reference conditions (excluding oxygen contribution) & Uncertainty in final measurement @ reference conditions due to uncertainty component arrising from leak and/or loss (assumed 2% max) in the sample system (uL)

$$uL = \frac{Conc \times \frac{2}{100}}{\sqrt{3}}$$

	Tubes uL mg/Nm³	**Condensate uL mg/Nm³**
Hydrofluoric Acid	0.0143	...
Hydrochloric Acid	0.00287	...
Nitric Acid	0.00574	...
Phosphoric Acid	0.0172	...
Sulphuric Acid	0.00574	...
Hydrogen Bromide	0.00574	...

$$Conc = \frac{M_{Recovered}}{V_m \times f_s \times f_{O_2}}$$

Uncertainty in final measurement @ Reference Conditions due to $uM_{Recovered}$

Charcoal Tube Results

	Maximum mg/Nm³	**Minimum mg/Nm³**	**Sensitivity**	**Standard Uncertainty mg/Nm³**
Hydrofluoric Acid	1.86	0.62	248.52	0.62
Hydrochloric Acid	0.37	0.12	248.52	0.12
Nitric Acid	0.75	0.25	248.52	0.25
Phosphoric Acid	2.24	0.75	248.52	0.75
Sulphuric Acid	0.75	0.25	248.52	0.25
Hydrogen Bromide	0.75	0.25	248.52	0.25

Condensate Results

	Maximum mg/Nm³	**Minimum mg/Nm³**	**Sensitivity**	**Standard Uncertainty mg/Nm³**
Hydrofluoric Acid				
Hydrochloric Acid				
Nitric Acid				
Phosphoric Acid				
Sulphuric Acid				
Hydrogen Bromide				

Uncertainty in final measurement @ Reference Conditions due to uV_{STD}

Charcoal Tube Results

	Maximum mg/Nm³	**Minimum mg/Nm³**	**Sensitivity**	**Standard Uncertainty mg/Nm³**
Hydrofluoric Acid	1.27	1.21	308.98	0.0283
Hydrochloric Acid	0.25	0.24	61.80	0.00567
Nitric Acid	0.51	0.49	123.59	0.0113
Phosphoric Acid	1.53	1.46	370.78	0.0340
Sulphuric Acid	0.51	0.49	123.59	0.0113
Hydrogen Bromide	0.51	0.49	123.59	0.0113

Combined Uncertainty (excluding Oxygen contribution)

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{stp})^2}$$

Charcoal Tubes: Determinand	**Combined Uncertainty mg/Nm³**	**Expanded Uncertainty mg/Nm³**	**Measured Concentration mg/Nm³**	**Percent of Measured Concentration**
Hydrofluoric Acid	0.62	1.24	1.24	100.13
Hydrochloric Acid	0.12	0.25	0.25	100.13
Nitric Acid	0.25	0.50	0.50	100.13
Phosphoric Acid	0.75	1.49	1.49	100.13
Sulphuric Acid	0.25	0.50	0.50	100.13
Hydrogen Bromide	0.25	0.50	0.50	100.13

DEScycle at Leicester University		**Installation Name**	**: Reaction Vessel**
Permit No	**: ...**	**Visit Details**	**: Investigative Emissions – July 2025**
Variation No	**: ...**	**Survey Dates**	**: 1st July 2025**
Report Ref	**: P6125 : R001**	**Report Issue Date**	**: 20th August 2025**

Acids Screen Uncertainty – Reaction Phase 3 – Test 1

Site: Descycle Ltd, Leicester University
Location: Materials Laboratory , Stack ID:Reaction Vessel

					Standard Uncertainty @ 95%		
Sampled Volume	V_m	0.00450	m³	uV_m	0.0001	m³
Meter Correction Factor or ml/count	**Yd**	0.996	...	...	...	...
Meter Temperature	T_m	302.00	k	uT_m	1.5	k
Barometric Pressure	ρ_b	1006.00	mBar		10.0	mBar
Oxygen content	$O_{2,m}$	20.90	%Vol	$uO_{2,m}$	1.25	%Vol
Moisture	H_2O	0.00	%Vol	uH_2O		%Vol

Tubes					
Determinand	**Recovered Mass**			**Standard Uncertainty**	
Hydrofluoric Acid	5.00	µg	**uM**	2.50	µg
Hydrochloric Acid	1.00	µg	**uM**	0.50	µg
Nitric Acid	2.00	µg	**uM**	1.00	µg
Phosphoric Acid	6.00	µg	**uM**	3.00	µg
Sulphuric Acid	2.00	µg	**uM**	1.00	µg
Hydrogen Bromide	2.00	µg	**uM**	1.00	µg

Note: In the following calculations, the sensitivity coefficient (C) is estimated using $C_i = \frac{\partial f}{\partial x_i}$

For each factor, uncertainty is then calculated by $C_i u_i$ **where** C **is the sensitivity coefficient,** u **is the standard uncertainty and** i **is the index identifying the contributing factor e.g. i=uV_m, uT_m etc.**

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = 1.00$$

Uncertainty in correction factor to STP due to measured barometric pressure uncertainty component (up$_b$), measured temperature of dry gas uncertainty component (uT_m) & measured moisture (uH_2O)

$$f_s = \frac{273}{T_m} \times \frac{\rho}{101.3} = 0.90$$

	Maximum	**Minimum**	**Sensitivity**	**ufstp**
up$_b$	0.48	0.47	0.000469	0.00469
uT_m	0.90	0.89	0.00297	0.00446
uH_2O	...	...	...	...

$$\frac{uf_s}{f_s} = \sqrt{\left(\frac{uP_b}{(P_b/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{100/(100 - H_2O)}\right)^2} = 0.00557$$

Uncertainty in volume @ STP due to volume correction factor uncertainty component (uVstd) & volume uncertainty component (uVm)

$$V_{std} = V_{measured} \times f_s = 0.00402$$

	Maximum m³	**Minimum m³**	**Sensitivity**	**Standard Uncertainty m³**
Effect of uf_s	0.00405	0.00400	0.00448	0.0000250
Effect of uV_m	0.00412	0.00392	0.89	0.000101

$$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uf_s}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = 0.0000917$$

Uncertainty of correction factor to reference conditions (excluding oxygen contribution) & Uncertainty in final measurement @ reference conditions due to uncertainty component arrising from leak and/or loss (assumed 2% max) in the sample system (uL)

$$uL = \frac{Conc \times \frac{2}{100}}{\sqrt{3}}$$

	Tubes uL mg/Nm³	**Condensate uL mg/Nm³**
Hydrofluoric Acid	0.0143	...
Hydrochloric Acid	0.00287	...
Nitric Acid	0.00574	...
Phosphoric Acid	0.0172	...
Sulphuric Acid	0.00574	...
Hydrogen Bromide	0.00574	...

$$Conc = \frac{M_{Recovered}}{V_m \times f_s \times f_{O_2}}$$

Uncertainty in final measurement @ Reference Conditions due to u$M_{Recovered}$

Charcoal Tube Results				
	Maximum mg/Nm³	**Minimum mg/Nm³**	**Sensitivity**	**Standard Uncertainty mg/Nm³**
Hydrofluoric Acid	1.86	0.62	248.52	0.62
Hydrochloric Acid	0.37	0.12	248.52	0.12
Nitric Acid	0.75	0.25	248.52	0.25
Phosphoric Acid	2.24	0.75	248.52	0.75
Sulphuric Acid	0.75	0.25	248.52	0.25
Hydrogen Bromide	0.75	0.25	248.52	0.25
Condensate Results				
	Maximum mg/Nm³	**Minimum mg/Nm³**	**Sensitivity**	**Standard Uncertainty mg/Nm³**
Hydrofluoric Acid				
Hydrochloric Acid				
Nitric Acid				
Phosphoric Acid				
Sulphuric Acid				
Hydrogen Bromide				

Uncertainty in final measurement @ Reference Conditions due to uV_{STD}

Charcoal Tube Results				
	Maximum mg/Nm³	**Minimum mg/Nm³**	**Sensitivity**	**Standard Uncertainty mg/Nm³**
Hydrofluoric Acid	1.27	1.21	308.98	0.0283
Hydrochloric Acid	0.25	0.24	61.80	0.00567
Nitric Acid	0.51	0.49	123.59	0.0113
Phosphoric Acid	1.53	1.46	370.78	0.0340
Sulphuric Acid	0.51	0.49	123.59	0.0113
Hydrogen Bromide	0.51	0.49	123.59	0.0113

Combined Uncertainty (excluding Oxygen contribution)

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{stp})^2}$$

Charcoal Tubes: Determinand	**Combined Uncertainty mg/Nm³**	**Expanded Uncertainty mg/Nm³**	**Measured Concentration mg/Nm³**	**Percent of Measured Concentration**
Hydrofluoric Acid	0.62	1.24	1.24	100.13
Hydrochloric Acid	0.12	0.25	0.25	100.13
Nitric Acid	0.25	0.50	0.50	100.13
Phosphoric Acid	0.75	1.49	1.49	100.13
Sulphuric Acid	0.25	0.50	0.50	100.13
Hydrogen Bromide	0.25	0.50	0.50	100.13

DEScycle at Leicester University		**Installation Name**	**: Reaction Vessel**
Permit No	**: ...**	**Visit Details**	**: Investigative Emissions – July 2025**
Variation No	**: ...**	**Survey Dates**	**: 1st July 2025**
Report Ref	**: P6125 : R001**	**Report Issue Date**	**: 20th August 2025**

Acids Screen Uncertainty – Reaction Phase 3 – Test 2

Site: Descycle Ltd, Leicester University
Location: Materials Laboratory , Stack ID:Reaction Vessel

					Standard Uncertainty @ 95%		
Sampled Volume	V_m	0.00452	m^3	uV_m	0.0001	m^3
Meter Correction Factor or ml/count	**Yd**	0.996	...	...	...	...
Meter Temperature	T_m	302.00	k	uT_m	1.5	k
Barometric Pressure	ρ_b	1006.00	mBar		10.0	mBar
Oxygen content	$O_{2,m}$	20.90	%Vol	$uO_{2,m}$	1.25	%Vol
Moisture	H_2O	0.00	%Vol	uH_2O		%Vol

Tubes					
Determinand	**Recovered Mass**			**Standard Uncertainty**	
Hydrofluoric Acid	5.00	µg	**uM**	2.50	µg
Hydrochloric Acid	1.00	µg	**uM**	0.50	µg
Nitric Acid	2.00	µg	**uM**	1.00	µg
Phosphoric Acid	6.00	µg	**uM**	3.00	µg
Sulphuric Acid	2.00	µg	**uM**	1.00	µg
Hydrogen Bromide	2.00	µg	**uM**	1.00	µg

Note: In the following calculations, the sensitivity coefficient (C) is estimated using $C_i = \frac{\partial f}{\partial x_i}$

For each factor, uncertainty is then calculated by $C_i u_i$ **where** C **is the sensitivity coefficient,** u **is the standard uncertainty and** i **is the index identifying the contributing factor e.g. i=uV$_m$, uT$_m$ etc.**

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = \quad 1.00$$

Uncertainty in correction factor to STP due to measured barometric pressure uncertainty component (upb), measured temperature of dry gas uncertainty component (uT$_m$) & measured moisture (uH$_2$O)

$$f_s = \frac{273}{T_m} \times \frac{\rho}{101.3} = \quad 0.90$$

	Maximum	**Minimum**	**Sensitivity**	**ufstp**
up$_b$	0.48	0.47	0.000469	0.00469
uT$_m$	0.90	0.89	0.00297	0.00446
uH$_2$O	...	...	...	...

$$\frac{uf_s}{f_s} = \sqrt{\left(\frac{uP_b}{(P_b/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{100/(100 - H_2O)}\right)^2} = \quad 0.00557$$

Uncertainty in volume @ STP due to volume correction factor uncertainty component (uVstd) & volume uncertainty component (uVm)

$$V_{std} = V_{measured} \times f_s = \quad 0.00404$$

	Maximum m^3	**Minimum m^3**	**Sensitivity**	**Standard Uncertainty m^3**
Effect of uf$_s$	0.00407	0.00402	0.00450	0.0000251
Effect of uV$_m$	0.00414	0.00394	0.89	0.000101

$$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uf_s}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = \quad 0.0000922$$

Uncertainty of correction factor to reference conditions (excluding oxygen contribution) & Uncertainty in final measurement @ reference conditions due to uncertainty component arrising from leak and/or loss (assumed 2% max) in the sample system (uL)

$$uL = \frac{Conc \times \frac{2}{100}}{\sqrt{3}}$$

	Tubes uL mg/Nm^3	**Condensate uL mg/Nm^3**
Hydrofluoric Acid	0.0143	...
Hydrochloric Acid	0.00286	...
Nitric Acid	0.00571	...
Phosphoric Acid	0.0171	...
Sulphuric Acid	0.00571	...
Hydrogen Bromide	0.00571	...

$$Conc = \frac{M_{Recovered}}{V_m \times f_s \times f_{O_2}}$$

Uncertainty in final measurement @ Reference Conditions due to uM$_{Recovered}$

Charcoal Tube Results

	Maximum mg/Nm^3	**Minimum mg/Nm^3**	**Sensitivity**	**Standard Uncertainty mg/Nm^3**
Hydrofluoric Acid	1.86	0.62	247.43	0.62
Hydrochloric Acid	0.37	0.12	247.43	0.12
Nitric Acid	0.74	0.25	247.43	0.25
Phosphoric Acid	2.23	0.74	247.43	0.74
Sulphuric Acid	0.74	0.25	247.43	0.25
Hydrogen Bromide	0.74	0.25	247.43	0.25

Condensate Results

	Maximum mg/Nm^3	**Minimum mg/Nm^3**	**Sensitivity**	**Standard Uncertainty mg/Nm^3**
Hydrofluoric Acid				
Hydrochloric Acid				
Nitric Acid				
Phosphoric Acid				
Sulphuric Acid				
Hydrogen Bromide				

Uncertainty in final measurement @ Reference Conditions due to uV$_{STD}$

Charcoal Tube Results

	Maximum mg/Nm^3	**Minimum mg/Nm^3**	**Sensitivity**	**Standard Uncertainty mg/Nm^3**
Hydrofluoric Acid	1.27	1.21	306.26	0.0282
Hydrochloric Acid	0.25	0.24	61.25	0.00564
Nitric Acid	0.51	0.48	122.50	0.0113
Phosphoric Acid	1.52	1.45	367.51	0.0339
Sulphuric Acid	0.51	0.48	122.50	0.0113
Hydrogen Bromide	0.51	0.48	122.50	0.0113

Combined Uncertainty (excluding Oxygen contribution)

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{stp})^2}$$

Charcoal Tubes: Determinand	**Combined Uncertainty mg/Nm^3**	**Expanded Uncertainty mg/Nm^3**	**Measured Concentration mg/Nm^3**	**Percent of Measured Concentration**
Hydrofluoric Acid	0.62	1.24	1.24	100.13
Hydrochloric Acid	0.12	0.25	0.25	100.13
Nitric Acid	0.25	0.50	0.49	100.13
Phosphoric Acid	0.74	1.49	1.48	100.13
Sulphuric Acid	0.25	0.50	0.49	100.13
Hydrogen Bromide	0.25	0.50	0.49	100.13

APPENDIX II
H1 CALCULATION SHEET – SCENARIO A

DEScycle - H1 Assessment of Emissions to Air - Scenario A

Acronyms / Abbreviations	
AQS = Air Quality Standard	HF = Hydrogen Fluoride
CH_2O = Formaldehyde	LOD = Limit of Detection
EA = Environment Agency	LT = Long-term
ELV = Emission Limit Value	PC = Process Contribution
HBr = Hydrogen Bromide	ST = Short-term
HCl = Hydrogen Chloride	VOC = Volatile Organic Compound

Calculation of Effective Stack Height	A1	A2
Building Height (m):	6.0	6.0
Actual Stack Height (m):	9.5	9.5
*Effective Stack Height (m):	5.81	5.81

Stage one screening:

Stack	Pollutant	Stack Height	ELV (mg/m^3) [a]	Volumetric Flow Rate (m^3/s) [b]	Discharge Rate (g/s)	Effective Stack Height (m)	Dispersion Factor ($\mu g/m^3/g/s$) LT	Dispersion Factor ($\mu g/m^3/g/s$) ST	PC ($\mu g/m^3$) LT	PC ($\mu g/m^3$) ST	Total PC [c] [d] ($\mu g/m^3$) LT	Total PC [c] [d] ($\mu g/m^3$) ST	AQS ($\mu g/m^3$) LT	AQS ($\mu g/m^3$) ST	PC as % of AQS LT	PC as % of AQS ST	PC Significant? [e] (>1%) LT	PC Significant? [e] (>10%) ST
A1	VOC (as acetone)	9.5	15	0.00478	0.0000717	5.81	81	1971	0.00578	0.141	0.0116	0.283	18100	362000	0.0001%	0.0001%	No	No
A2		9.5	15	0.00478	0.0000717	5.81	81	1971	0.00578	0.141								
A1	VOC (as acetaldehyde)	9.5	5	0.00478	0.0000239	5.81	81	1971	0.00193	0.0471	0.00385	0.0942	370	9200	0.001%	0.001%	No	No
A2		9.5	5	0.00478	0.0000239	5.81	81	1971	0.00193	0.0471								
A1	Hydrogen chloride (HCl)	9.5	5	0.00478	0.0000239	5.81	81	1971	0.00193	0.0471	0.00385	0.094	20	750	0.02%	0.01%	No	No
A2		9.5	5	0.00478	0.0000239	5.81	81	1971	0.00193	0.0471								
A1	CH_2O	9.5	5	0.00478	0.0000239	5.81	81	1971	0.00193	0.0471	0.00193	0.0612	5	100	0.04%	0.06%	No	No
A1	Hydrogen fluoride (HF) - human health	9.5	1	0.00478	0.0000048	5.81	81	1971	0.00039	0.0094	0.00039	0.0094	16	160	0.00%	0.01%	No	No
A1	Hydrogen fluoride (HF) - ecological health	9.5	1	0.00478	0.0000048	5.81	81	1971	0.00039	0.0094	0.00012	0.0056	0.5	5	0.02%	0.1%	No	No
A1	HBr	9.5	10	0.00478	0.0000478	5.81	81	1971	0.00385	0.0942	0.00385	0.0942	N/A	700	N/A	0.01%	N/A	No
A1	Nitric acid	9.5	10	0.00478	0.0000478	5.81	81	1971	0.00385	0.0942	0.00385	0.0942	52	1000	0.01%	0.01%	No	No
A1	Phosphoric acid (as orthophosphoric acid)	9.5	10	0.00478	0.0000478	5.81	81	1971	0.00385	0.0942	0.00385	0.0942	N/A	200	N/A	0.05%	N/A	No
A1	Sulphuric acid	9.5	10	0.00478	0.0000478	5.81	81	1971	0.00385	0.0942	0.00385	0.0942	10	300	0.04%	0.03%	No	No

Notes to H1 Calculation:

The EA's *Air emissions risk assessment for your environmental permit* was the guidance used to carry out the assessment.

[a] Proposed ELVs.

[b] Refer to Appendix I of the main report for the stack emissions monitoring report - the highest volumetric flow was used to ensure the worst-case emission rate and impact has been assessed.

[c] Where the environmental standard is measured using a different time period to an hourly average, the PC must be multiplied by the relevant conversion factor (i.e., 1.3 for the 30 minute averaging period for ST CH_2O, 0.59 for the 24 hour averaging period for ST HF (ecological standard) and 0.31 for the weekly averaging period for LT HF (ecological standard)).

[d] When a substance is released from more than one point, you must add up the substance's PC from each source to get the total PC for the substance.

[e] If the LT PC is less than 1% of the LT AQS and / or the ST PC is less than 10% of the ST AQS, then no further assessment is required.

APPENDIX III
H1 CALCULATION SHEET – SCENARIO B

DEScycle - H1 Assessment of Emissions to Air - Scenario B

Acronyms / Abbreviations	
AQS = Air Quality Standard	HF = Hydrogen Fluoride
CH_2O = Formaldehyde	LOD = Limit of Detection
EA = Environment Agency	LT = Long-term
ELV = Emission Limit Value	PC = Process Contribution
HBr = Hydrogen Bromide	ST = Short-term
HCl = Hydrogen Chloride	VOC = Volatile Organic Compound

Calculation of Effective Stack Height	A1	A2
Building Height (m):	6.0	6.0
Actual Stack Height (m):	9.5	9.5
*Effective Stack Height (m):	5.81	5.81

Stage one screening:

Stack	Pollutant	Stack Height	ELV (mg/m^3) [a]	Volumetric Flow Rate (m^3/s) [b]	Discharge Rate (g/s)	Effective Stack Height (m)	Dispersion Factor ($\mu g/m^3/g/s$) LT	Dispersion Factor ($\mu g/m^3/g/s$) ST	PC ($\mu g/m^3$) LT	PC ($\mu g/m^3$) ST	Total PC [c] [d] ($\mu g/m^3$) LT	Total PC [c] [d] ($\mu g/m^3$) ST	AQS ($\mu g/m^3$) LT	AQS ($\mu g/m^3$) ST	PC as % of AQS LT	PC as % of AQS ST	PC Significant? (>1%) [e]	PC Significant? (>10%) [e]
A1	VOC (as acetone)	9.5	15	0.0800	0.00120	5.81	81	1971	0.0967	2.37	2.03	49.7	18100	362000	0.0112%	0.0137%	No	No
A2		9.5	15	1.60	0.0240	5.81	81	1971	1.93	47.3								
A1	VOC (as acetaldehyde)	9.5	5	0.0800	0.000400	5.81	81	1971	0.0322	0.788	0.677	16.6	370	9200	0.183%	0.180%	No	No
A2		9.5	5	1.60	0.00800	5.81	81	1971	0.645	15.8								
A1	Hydrogen chloride (HCl)	9.5	10	0.0800	0.000800	5.81	81	1971	0.0645	1.58	1.35	33.1	20	750	6.77%	4.42%	Yes	No
A2		9.5	10	1.60	0.0160	5.81	81	1971	1.29	31.5								
A1	CH_2O	9.5	5	0.0800	0.000400	5.81	81	1971	0.0322	0.788	0.0322	1.02	5	100	0.64%	1.02%	No	No
A1	Hydrogen fluoride (HF) - human health	9.5	1	0.0800	0.000080	5.81	81	1971	0.0064	0.16	0.0064	0.16	16	160	0.04%	0.10%	No	No
A1	Hydrogen fluoride (HF) - ecological health	9.5	1	0.0800	0.000080	5.81	81	1971	0.0064	0.16	0.0020	0.093	0.5	5	0.40%	1.9%	No	No
A1	HBr	9.5	10	0.0800	0.000800	5.81	81	1971	0.0645	1.58	0.0645	1.58	N/A	700	N/A	0.23%	N/A	No
A1	Nitric acid	9.5	10	0.0800	0.000800	5.81	81	1971	0.0645	1.58	0.0645	1.58	52	1000	0.12%	0.16%	No	No
A1	Phosphoric acid (as orthophosphoric acid)	9.5	10	0.0800	0.000800	5.81	81	1971	0.0645	1.58	0.0645	1.58	N/A	200	N/A	0.79%	N/A	No
A1	Sulphuric acid	9.5	10	0.0800	0.000800	5.81	81	1971	0.0645	1.58	0.0645	1.58	10	300	0.64%	0.53%	No	No

Stage two screening for significant PCs:

Pollutant	Background ($\mu g/m^3$) LT [f]	PEC ($\mu g/m^3$) LT [g]	PEC as a % of LT AQS	PEC Significant? (>70%) [h] Long-term	ST AQS minus 2x LT Background	ST PC as % of ST AQS minus 2x LT background	Stage two screening ST PC Significant? [h]
HCl	0.118	1.47	7.36%	No	N/A	N/A	N/A

Notes to H1 Calculation:

The EA's *Air emissions risk assessment for your environmental permit* was the guidance used to carry out the assessment.

[a] Proposed ELVs.

[b] Anticipated volumetric flow rates (see Section 1.1.4. of the main report for details).

[c] Where the environmental standard is measured using a different time period to an hourly average, the PC must be multiplied by the relevant conversion factor (i.e., 1.3 for the 30 minute averaging period for ST CH_2O, 0.59 for the 24 hour averaging period for ST HF (ecological standard) and 0.31 for the weekly averaging period for LT HF (ecological standard)).

[d] When a substance is released from more than one point, you must add up the substance's PC from each source to get the total PC for the substance.

[e] If the LT PC is greater than 1% of the LT AQS and / or the ST PC is greater than 10% of the ST AQS, then further assessment is required.